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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

A Pause on the Road.

ONCE again we have listened to the bells ringing the Old Year out and the New Year in; and now we brace ourselves to travel another stage on life's journey. What are to be the circumstances of this stage, we do not know; but in preparing ourselves for it, we can gain some comfort, some strength, and perhaps some guidance, from the lessons of the past. Therefore, before turning our faces towards 1930, let us pause briefly to glance back upon 1929. It has been a not uneventful year, both generally speaking and when viewed from the standpoint of the gas industry. In some directions, it has witnessed hopes fulfilled; in others, there have been disappointments.

One looks in vain through the year that has gone for any real endeavour of the kind of which the country stands most in need. Under present conditions, no Government can rightly claim to have done the utmost good for the country in general—whatever may superficially appear to be the case as regards any particular section of the community—that does not exert its main efforts in the direction of economy. The ability to spend money has never been considered a mark of genius; nor should it be so esteemed to-day. It has long been the opinion of the "JOURNAL" that the task of reconstituting our staple industries upon a basis of lasting prosperity is practically impossible of accomplishment under the crushing weight of present taxation; and every addition to the burden must remove the goal yet further away. Signs of the realization of this fact by our legislators are not yet insistent; but fortunately there are strong indications of an awakening to the true position on the part of the business community. If it is the case that our principal competitors are reducing their taxation, it should be obvious to the least thinking of us that we cannot afford to increase our own.

But that is not sufficient; we must reduce ours, as others are doing. The statement that in thirty years the outlay on what is termed "social service" has risen from 14s. per head of the population to £8 6s. points the course on which the Ship of State is set; the fact that the stupendous sum raised by income-tax is paid by 5 p.ct. of the population, or by 7 p.ct. of the electorate, shows how it is that such a course remains possible. Lord Melchett has been drawing attention to these matters; and it is our hope that he will persist in his endeavours to arouse the country to its danger. By what means can the mass of the electorate be brought to understand that, however small may be the proportion of the population who in the first place have to find the bulk of the direct taxation, this draining of resources must indirectly affect every class of the community—that, indeed, "He pays who only stands and waits?" A satisfactory answer to this question is still awaited; urgency requires that it should be sought with diligence.

Our Industry.

WITH others, our own industry has naturally had to bear its share of the disabilities resulting from the burden of taxation; but a great deal of solid work has been performed, and the future, granted favourable extraneous conditions, is bright and full of promise. During the year that has gone, effort has received a big reward which will make 1929 memorable in the history of the industry. We refer, of course, to the granting of a Royal Charter to the Institution of Gas Engineers. This Charter, by making membership of the Institution dependent upon qualification, and by opening wider the doors to those who are so qualified, can only lead to enhanced prestige for the Institution and to added dignity for those engaged in the gas profession. The Parent Body will now go forward, equipped in every way to represent worthily a great public service. Already we see proof of increased activity by the arrangement of an autumn meeting, which proved to be of high technical value. Our volumes bear testimony to those who took upon themselves the lion's share of the labour entailed in securing the Royal Charter.

There are in the ranks of the industry many hard workers; and new ones arise to take the place of those who leave us. The gas industry has never been unmindful of its debt to the departed; and among the great names that have gone down to history none will be better cherished or more deservedly remembered than that of Charles Hunt, who died last March, in his 87th year. Mr. Hunt spent a great part of his working life with the Birmingham Gas Department; but his other activities were so many that it may be said every part of the industry owes much to him. At the moment of writing, news comes of the death, on Christmas Eve, of another earnest worker, Mr. John Petty Leather, who had since early last month been suffering from the effects of being knocked down by a motor-car. Mr. Leather, who, at the time of his death was 70 years old, was for over a quarter of a century Gas Engineer to the Burnley Corporation; but he, also, leaves his mark on the industry through work in a wider sphere—particularly in connection with refractory materials research. Another outstanding personal matter of the past year—though happily of a different nature from the two just referred to—was the retirement at the end of September of Mr. Thomas Glover from the position of Engineer of the Norwich Station of the British Gas Light Company, Ltd., on the completion of twenty-eight years' service. Mr. Glover has done an immense amount of good work for the industry, and we look confidently to him for further help in the future.

The opening of the new Partington Gas-Works of the Manchester Corporation affords evidence of the industry's vitality, as does also the admirable Gas Section which, under the auspices of the Institution of Gas Engineers, the Society of British Gas Industries, the British Com-

mercial Gas Association, and the National Gas Council, has now become a feature of the annual British Industries Fair at West Bromwich. Gas was also well to the fore at the North-East Coast Exhibition, Newcastle-upon-Tyne. The British Commercial Gas Association Conference at Eastbourne was graced by the presence of the Duke and Duchess of York—this constituting, as we pointed out at the time, the first public recognition by the Royal Family of the industry as an organized entity performing national services through national institutions. At the same time the Society of British Gas Industries are continuing their vital work under the Presidency of Viscount Cecil of Chelwood. All this is of good augury; and we derive inspiration therefrom. Our feeling is that which was expressed by Sir David Milne-Watson in his message by wireless telephony to the American Gas Association Convention—one of hope and confidence in the future of the gas industry.

Work from Within.

IN the year which has now drawn to a close, more than in any other in its history, it has been vital for its well being that the gas industry should present a united front to the world, and that it should be able to speak through its central organization with a voice at once authoritative and unanimous. For it has been a period during which many difficulties, most of which could not well have been met by a series of isolated units, have presented themselves, and have demanded immediate concentrated and skilful attention. They have arisen from a variety of causes. Upon the pretext that the economic conditions obtaining in other industries have rendered it necessary, proposals of the most far-reaching and menacing kind—in one case at least touching the very existence of the gas supply service as we know it—have been put forward. Thus the ill-considered proposals of another coal carbonizing industry that they should be empowered to supplant the gas industry in all cases where they felt themselves able to do so, turning the latter into a mere distributing service, were advanced with due plausibility, and had to be countered.

The whole question is still before the Area Gas Supply Committee; and we have no intention of emulating those on the other side, who, with an object which can only be guessed at, have published an anticipatory scheme. Suffice it to say that the case for the gas industry has been admirably put, and the finding of the Committee is awaited with confidence. The thorough examination which the Committee are making of the whole position cannot but throw into proper perspective the legislative disabilities under which the gas industry labours, and may thus hasten the introduction of that comprehensive measure of reform of which the Gas Undertakings Act of 1929 is but an earnest. It will be remembered that in the Second Report of the National Fuel and Power Committee, to which reference was made in our columns at the time, the proposals put forward by the National Gas Council in regard to this matter were unanimously recommended for adoption. The moment is not opportune for pressing for new legislation; but as soon as it presents itself, it will be seized, and in the meantime the ground is being prepared in many directions.

Another example of what appears to be an audacious attempt to single-out the gas industry, along with a few others, for exploitation is provided by the suggestion attributed recently to a highly-placed official that public utility enterprises are being supplied with coal by the coal industry at a loss, or at an unremunerative level, and that this means in practice that the depressed coal industry is subsidizing these enterprises. It is news to us that the depression in the coal trade is in any way due to the granting of subsidies to public utility undertakings. We have always understood that gas undertakings purchased their coal in the open market, and that colliery companies have competed for what have invariably been regarded as very desirable contracts. However that may be, the suggestion now made is that the gas industry should do the subsidizing. This, of course, would mean that the price of gas would have to be raised, thus affecting the pockets of some 36 million gas users, and prejudicing the industries which consume gas. The most strenuous opposition to the proposals will certainly be offered on behalf of the industry; and should it be impossible to arrive at an arrangement which is satisfactory in the interests of consumers, gas undertakings will doubtless be recommended to take other steps for their protection.

Labours of the "N.G.C."

THE industry has had to submit, although there is a general feeling that it was unnecessary, to an inquiry being conducted by the Committee appointed by the Board of Trade to investigate the increase in the number of deaths attributed to coal gas poisoning. The Committee have not yet reported, so that comment on the merits is not permissible. It must be borne in mind, however, that many of the matters covered by the inquiry are of vital interest to the industry; and those who have studied the evidence which has been put forward on the industry's behalf will agree that it could not be improved upon. One fact which emerges clearly is that while the number of suicides by gas poisoning has increased in recent years, the number of accidental deaths remains remarkably low.

A further matter upon which public attention has been somewhat sharply focussed during the past year, and with one aspect of which the Gas Poisoning Committee have had to deal, is the question of gas mains in highways. The new methods of road construction devised to withstand the onslaughts of heavy, fast, and ever-increasing traffic have undoubtedly given rise to a series of new problems for those responsible for underground services, and these are being faced and will no doubt be solved in conjunction with the other interests concerned. The solution, however, must take into account not only the essential services rendered to the community by public utility undertakings and the undesirability of increasing the cost of these services, but also the fact that the carriage by means of underground pipes of the commodities supplied—water, energy, and heat units—is in itself a very substantial alleviation of the burden which otherwise the roadways would have to bear.

Throughout the year progress has been made towards the solution of the problems which beset the industry in respect of the disposal of effluent. On the chemical and technical side, the Committee set up by the Institution of Gas Engineers have continued to investigate this matter; while the National Gas Council have directed their attention more particularly to the general and legal aspects of the case. The burden which the present inability to dispose of trade effluent places upon industry is becoming increasingly apparent, and a Joint Committee of the Ministry of Health and the Ministry of Agriculture and Fisheries have been appointed to hear the views of traders on the subject. A proof of evidence has been prepared by the Federation of British Industries which represents the considered views of the principal industries affected by the question. The National Gas Council have been represented on the Drafting Committee of the Federation of British Industries, and are also preparing a proof of evidence on behalf of the gas industry to submit to the Government Joint Committee.

The matters we have touched upon, and many others like them in a sense extraneous to the ordinary conduct of individual gas undertakings, yet of vital interest to each, indicate the value of one part of the work which the National Gas Council are called upon to do, and the importance of having such a body to maintain a ceaseless vigilance and to speak and act for the industry upon the countless occasions when speech and action are required. The work of the Central Executive Board, of the many Committees which work on its behalf, and of those who as witnesses, or in other capacities, serve as its mouthpiece is invaluable. It is performed by men from every part of the country, who, though already well laden with the responsibilities and cares of their own undertakings, yet find time to give freely of their skill, energy, and experience for the benefit of the industry as

a whole. This work, too, becomes increasingly exacting as the economic structure of the country becomes more and more complex, as the old lines of demarcation between industry and industry disappear, and as the State, for good or evil, tends to an ever-growing extent to interfere in industrial matters. Yet it is performed ungrudgingly and surpassing well. Few indeed have the good fortune to be served so well by their representatives; and the gas industry is greatly to be congratulated that during a difficult year its destinies have been so ably and so faithfully safeguarded.

Technical Progress in Carbonization.

FROM the viewpoint of technical advance, it would be difficult, if not impossible, to find a more progressive year than that which ended yesterday. It is, of course, wholly impracticable to enter into a detailed list of plant improvements, process innovations, or fundamental research carried out in 1929; we merely desire to record a few new practices or ideas, and to suggest their direction, and we crave the indulgence of our readers if, in the short space at disposal, our inevitable omissions appear at first glance unforgivable.

Carbonization, the mainspring of the gas industry's complicated machine, must take pride of place in any such review as this; and if in many forms of plant the improvements are not spectacular, they are important. Attention to refractory materials, thermal insulation, coal and coke handling, coke quenching and screening, and so on, has had the effect of prolonging the life of plant, rendering working conditions more pleasant, and generally improving the efficiency of the composite process of converting the energy of coal into other more valuable forms without appreciable loss. Coupled with these mechanical improvements has developed a change of ideas regarding the working of plant generally—a change which has transformed potential benefits into practical assets. We refer particularly to the recognition that "throughput" and "therms per ton" must be considered jointly, that surplus heat employed for steam-raising in waste-heat boilers must be a true "surplus," and that the best results from any plant can be achieved only by persistent, intelligent, detailed technical supervision and control.

To turn from the general to the particular, we may instance a few of the outstanding installations erected during the year, or in course of erection, as indicating carbonizing tendencies. There occurs at once the arresting departure from tradition at the Beckton Works of the Gas Light and Coke Company, where Koppers coke ovens capable of treating 1200 tons of coal a day are being erected. This installation, which will increase the output of the world's largest gas-works by over 85,000 therms daily, will, with the necessary handling and subsidiary plant, cost about a million pounds sterling. It is being laid down so as to be capable of extension, if it proves satisfactory, by three further units of similar size. Then we have the 3-million c.ft. per day "C.O.L." intermittent vertical chamber oven plant at the works of the Wandsworth, Wimbledon, and Epsom District Gas Company, with its high make of gas per unit area, freedom in choice of coals, low maintenance, labour, and power charges, and low breeze production. This plant has the interesting feature of utilizing clean producer gas, and it is significant that the Company are about to instal a larger unit. It is a sign of the times that the Chapel, Whaley, and District Gas Company have installed continuous vertical chambers, on the Koppers principle, as their gas-making system; and to them belongs the credit of being the first concern in this country to adopt this type of plant. In this also clean producer gas is employed; and the system of carbonization is extremely flexible.

Flexibility is the greatest virtue of gas manufacture; and we doubt whether there exists a more flexible plant than that at the Dawsholm Works of the Glasgow Corporation. In brief, it consists of two benches of intermittent vertical chambers and two benches of continuous vertical retorts, both by the Woodall-Duckham Company, together with coal washing, blending, and handling plants; and it enables the Glasgow Gas Department to purchase cheap coal from various sources, in the knowledge that its treatment will result in high thermal yields of gas and excellent coke. The Dawsholm plant is indicative of the broader vision of the present-day gas engineer in that it is a "press-the-button" works from the inlet of the coal to the outlet of the gas and coke; it constitutes an apt illustration that electrical equipment can be employed to advantage in gas manufacture. We have not yet referred to horizontal retorts, but in respect of these, as with other forms of carbonizing plant, improved construction has led to better results. The new Partington Station of the Manchester Corporation Gas Department illustrates the advances made recently in both horizontal and vertical retorts. The former, by Drakes Ltd., are constructed of silica segments, and are fired by producer gas made in one of the largest and most complete external plants in the country. The verticals are Glover-West 40-in. "New Model;" each setting being heated by a built-in producer, though here again provision is made for heating by gas generated in external producers. The Dempster-Toogood setting of horizontal retorts at the Devonport Gas-Works is another example of the recent advances in this method of carbonization.

Any note, however brief, on gas-making developments in 1929 would be incomplete without reference to complete gasification and to the purchase of coke oven gas by gas undertakings. Regarding the former, the Humphreys & Glasgow plant at the Mill Hill Works of the North Middlesex Gas Company is of great interest. Though producing coal gas to the extent of 20 to 25 p.ct. of the total make, it has the elasticity and other collateral advantages of standard carburetted water gas plant; and—in common with all types of complete gasification units—as the specific gravity of the mixed gas (without oil carburetting) is less than that of standard carburetted water gas of the same calorific value, a wider range of admixture in the town supply is practicable. Unfortunately no "costs per therm" have yet been published. As to the purchase of coke oven gas, Sheffield's new supply from the Becker ovens at the Handsworth Works of the Nunnery Colliery Company, and the much-discussed Gardner contract of the Glasgow Corporation are more than worthy of note.

It will be appreciated that ultra-conservatism, with its narrow view of safety, has given place to a healthy encouragement of new plant and processes likely to lead to cheaper gas production. In 1929 new ideas have been enthusiastically received and considered with commendable freedom from traditional bias. When we turn to low-temperature carbonization, we find the same attitude dominating the mind of the gas engineer; he is not averse to low temperatures merely because they are low. There are, as our readers are aware, four low-temperature plants operating on a commercial scale in London Gas-Works, though we know of no pronouncement to the effect that any one of these plants is a clear financial success. Further patience is needed. Of the plants in no way connected with gas undertakings, the Bussey installation at Glenboig and the "Coalite" plant at Askern, both inaugurated during the year, and described in the "JOURNAL," should be mentioned. The Company responsible for the latter plant—Low Temperature Carbonisation, Ltd.—are at present erecting at the Greenwich Works of the South Metropolitan Gas Company a "Coalite" installation destined to treat 100,000 tons of coal a year.

Distribution and Research.

IN the field of distribution a very noteworthy feature of 1929 has been the increasing popularity of the waterless types of gasholder, of which there are now many installed. Pressure storage, too, has come in for a good deal of discussion, owing to the advantages of decentralization of pressure and volume control under modern conditions. Corrosion of mains has received some attention, but not half as much as the importance of the subject merits; after all, the capital of the gas industry which

is sunk underground, where decay goes on unseen, is enormous. Another matter which has so great a bearing on efficient service to the consumer—dehydration of gas—has been advanced by publication, in the "JOURNAL," of the working results of a "Dri-Gas" plant at Portsmouth, and of the paper by Mr. C. Cooper, of Messrs. W. C. Holmes & Co., Ltd., before the convention of the American Gas Association. England has sometimes been censured for her reluctance to adopt new ideas and pioneer technical development as compared with other countries. In this instance, however, the process has been accorded fair trial and ready acceptance. Works of all capacities are now distributing dehydrated gas, and the possible disadvantages of the process have proved to be theoretical bogeys of no great consequence.

The research workers of the industry, though not too happy last June, thoroughly enjoyed themselves in November, when a special meeting of the Institution was convened to discuss their work. Nor was this enjoyment confined to the research workers themselves, for those present at the meeting were able to realize perhaps more fully than ever before that the investigations at Leeds University and elsewhere remain academic only if the makers of gas fail to apply the findings practically. There was ample evidence at the November meeting that they can be applied to good purpose; and those who were unable to attend will have been able to appreciate this through the columns of the "JOURNAL."

Though we are still on the threshold of our knowledge of the nature of coke and the manner of its formation, much information has been gained during the past few years. Last year was certainly one of publication of this knowledge; what we may term the "Leeds" theory, that a coke may consist of two types of carbon, one igniting at a low temperature, and the other at a higher one, being of particular interest. We summarized this theory, and pointed to its bearing on the production of an easily ignited domestic coke, in the "JOURNAL" a few weeks ago (Nov. 20, 1929, p. 506), so that it is unnecessary to expatiate on the subject in this brief general review. "Studies in Carbonization" have proceeded apace; the ammonia situation has been tackled as never before; and the terrors of the effluents problem have been greatly lessened.

The most striking—and at the same time the most gratifying—feature of the year 1929, so far as research is concerned, has without doubt been the combined laboratory and large-scale method of investigation undertaken by the Gas Light and Coke Company, who, with an alacrity which reflects the greatest credit on them, have broadcast the findings for the benefit of the whole industry, and, indeed, of technology in general. A trinity of these investigations springs at once to the mind—ammonia, gas oils, and benzole recovery. In regard to the first-named research, hundreds of pounds have already been saved by individual undertakings who have appreciated the significance of the results, and have applied the general recipe to their particular conditions. New light has been shed not only on the means by which carburetting efficiency can be increased, but also on the characteristics of the raw materials—oils—and their evaluation in the laboratory. And as for benzole recovery, the work on the active charcoal process published last month has transformed the outlook of engineers on this method. Other work on benzole, both in the laboratory and as a general theoretical conception, has made it evident that the closest consideration must be paid to means for its recovery. Here again, we have dealt with this so fully in recent issues of the "JOURNAL" that repetition of the reasons for our belief that gas undertakings will shortly be recovering liquid benzole extensively is wholly unnecessary.

In the foregoing, we have resolutely set aside many developments in technique—such as the better manufacture and use of refractory materials; fundamental work on the insulation of gas-consuming appliances and on the products of combustion from these appliances; more efficient means of securing and maintaining, through a multitude of channels, the goodwill of consumers. If, however, we have not proved our contention in the opening paragraph of this section on technical advance during 1929, then we have failed in our purpose.

Coal.

THE story of coal in 1929 was very largely crammed into the last few weeks of the year, and unfortunately the principal events were once again of a political nature. The fears expressed, when a Socialist Government was formed in May, that political interference with the coal industry was inevitable, were realized when the Coal Mines Bill appeared on Dec. 11. The details of this are too fresh in mind to require more than passing reference, on this occasion, to its main proposals. Its object is to reduce the miners' working day by half-an-hour as a first instalment of the reduction of one hour which was one of the party's chief election promises. In the hope of rendering this possible without any reduction in the miners' earnings, it is proposed in the Bill to legalize a marketing scheme, the inherent inequalities of which were fully exposed during the debate on the second reading in the House. The chief objection is that there is apparently no limit to the prices which the home consumer can be made to pay for coal, except that at which it will become cheaper to import foreign coal. The home consumer would thus be penalized to the benefit of the foreigner, which, of course, is not only iniquitous, but absurd. As we are writing history, it will suffice here to record that the Bill passed its second reading just before the recess by an exceedingly narrow margin, and that home industries, including the great one in which we are primarily interested, are hoping for some redress in the Committee stages from the prospect of their raw material being controlled against them by a highly involved bureaucracy managed by the coalowners and the possibility of disorganization which would go with it.

As regards the purely commercial aspect, the year was one of steady progress. Free from labour troubles since the great upheaval of 1926, and with the lowering of production costs which resulted from it, the owners claim to have won back 85 p.ct. of the export trade which suffered so severely, and to be well on the way to recovering the whole of it; and this in the face of every effort on the part of the Governments of other coal-producing countries to retain what they had gained, by subsidies and all other available means. We do not propose to quote row upon row of figures, but it is interesting to record that exports to the end of November amounted to 55 million tons, against 45 millions for the corresponding period of 1928, at an increased value of over £8 million. It is all the more regrettable, in view of this progress, that the industry should not be allowed a little longer in which to attempt to recover its financial status, and with it the position of workers and shareholders, instead of having forced upon it an avowedly uneconomic increase in cost per ton, with the hope of counteracting this at the expense of other vital British industries.

That the recovery of the past year rests upon solid foundations is evidenced by the fact that the market has remained sound in spite of the alarms of recent months. The foreigner has had his lesson since the war with regard to British coal, and, at any threat or prospect of trouble, he is inclined nowadays to go elsewhere if he can. Yet in the present instance the market has held all through, with only quite temporary periods of weakness; and it seems that there is a very genuine demand, especially for the better grades. Looking back at market quotations for typical British export coals, we see that Wear special gas coals were at about 15s. f.o.b. at the beginning of the year, against 17s. or more at the present time. Best qualities have improved from 14s. 9d. to nearer 17s., and second-class gas from 13s. 6d. to about 15s. 6d., while Durham coking coals are round 16s., against 13s. 6d. last January. While the industry as a whole cannot be said to have paid its way, it has come much nearer to doing so than for several years past. Once again it is being thrown into the melting-pot, and time alone will show whether politics can rise superior to economic facts.

The one consolation in the situation that is apparent to all is that a more conciliatory spirit prevails within the industry, which offers better prospects of continuity of the essential operation of coal getting than, perhaps, the country has enjoyed for many years.

Bye-Products in 1929.

DURING the year the world's production of nitrogenous fertilizers increased by about 22½ p.ct., equal to a total increased tonnage of 389,000 tons expressed as nitrogen. Of this amount, Chili nitrate contributed 100,000 tons, and other forms of nitrogen the remainder. The world's consumption rose by only 14 p.ct., as compared with 25 p.ct. in the previous season. Further increase in production, chiefly as synthetic sulphate of ammonia, is expected during the coming year; estimates varying from 250,000 to 400,000 tons of nitrogen. As stocks were carried forward from last year, a further consumption of 22 p.ct. would be required to absorb the lower of these two estimates, together with the excess stocks. Selling prices for the year have been only slightly below those of the previous year, except for Chili nitrate, where the reduction has been about 10 p.ct.; but for the coming fertilizer year prices of all nitrogenous fertilizers have been lowered by 10 p.ct.

The general quality of sulphate of ammonia produced has remained stationary, and caking troubles on storage are still being experienced. The synthetic product is by no means free from this disadvantage, and the position to-day is that the best qualities of bye-product sulphate are better than the synthetic product, as regards both ammonia content and freedom from caking. Between the highest qualities of bye-product material and the lowest there is, however, a wide margin.

On the financial side of bye-product sulphate the results continue to be disappointing, and at many works the manufacture is only continued as a means of getting rid of the ammonia liquor. The problem has been investigated in all its bearings by a Committee appointed by the Institution of Gas Engineers, and much useful information is contained in the first report of this body. It is obvious that, in the present state of knowledge, no known process is going to revolutionize this side of the coal carbonization industry.

Possible means of effecting economies are indicated in the process of ammonia recovery on the works, leading to the production of a more concentrated liquor. If we might venture an opinion, it would be that the greatest economies will be obtained by concentration of the sulphate plants in larger units, either by concentrating the manufacture of gas on larger units through amalgamation of the smaller companies, or, where this is impossible, by using the existing ammonia stills to concentrate the crude liquor to concentrated ammonia liquor containing (say) 15 p.ct. of ammonia, which would then be transported to central sulphate plants. The latter would have to be supplied with acid at the cheapest possible price, produced on the spot from spent oxide. The results of the London Gas Companies show that such a system (with modifications) can still be made to yield a fair profit.

The world production of creosote has shown a further increase, due principally to the large producers of tar in America finding it profitable to distil some of their tar to creosote and pitch, instead of using it directly as fuel. New methods of distillation of tar are having their influence on this position. The creosote market has, therefore, become more difficult, and troubles are not likely to diminish. New uses for creosote are being sought, and the possibilities of using it as a gas-enriching oil in water gas plants have been investigated, but so far not with very encouraging results. Large quantities of this material are now being used as a fuel in direct competition with fuel oil and low-temperature tar.

The pitch market has hardened somewhat during the year, and the probable cause of this is the use of increasing quantities of tar for road purposes. In Great Britain between 35 and 45 p.ct. of the tar production is now employed for the manufacture of road tar and various compositions. The consumption in France has increased, and that country now uses the bulk of her own production, and, in addition, imports considerable quantities. In Germany, consumption of tar for road purposes is increasing, but the proportion employed is still very much less than in Great Britain.

The Ministry of Transport has accepted the new specifications for road tar, which have resulted from the efforts of the British Road Tar Association. The publication of the volume entitled "Standard Methods for Testing Tar and Its Products" may be looked upon as a first step in the rationalization of the scientific side of the tar industry. This work is the outcome of a suggestion by Mr. W. G. Adam at the Manchester Tar Conference in 1926, when a Joint Committee representing the Fuel Section of the Society of Chemical Industry, the Coke Oven Managers' Association, and the Institution of Gas Engineers was requested to devise means for the formation of a representative Committee to standardize, as far as possible, the methods of testing tar and its constituents. The National Benzole Association has published standard specifications for benzole and the other hydrocarbon products contained in the light oil fraction of coal tar.

Gas Stocks and Shares.

DURING the past year, investors in the stocks and shares of public utility undertakings have had reason to rejoice in the selection of their investments. The general depression which has prevailed on the Stock Exchange for some months past has naturally affected the market values of gas stocks, but the depreciation is confined to but a few companies, and the fall in values in most cases is infinitesimal when compared with the disastrous losses on some of the important industrial shares.

With regard to those gas investments that have depreciated during the year, it is curious to note that the large Metropolitan and the Suburban Companies have been the chief sufferers, viz.: South Metropolitan ordinary 7½ points, Commercial ordinary 7 points, South Suburban 7 points, Croydon sliding-scale 5 points. On the other hand, Wandsworth "A" stock has advanced 5 points and the North Middlesex 6 p.ct. no less than 10 points. It is interesting to note that the rise in the North Middlesex stock follows a similar increase in the year 1928. There has been no transaction recorded on the London Exchange during the year in respect of the East Hull 5 p.ct. stock, and only one in the case of the Wandsworth "A" stock. In regard to the Provincial undertakings, the two stocks to show the most appreciation are the Hastings and St. Leonards 5 p.ct., 3 points; and Portsmouth 4 p.ct., 5 points. Bristol 5 p.ct. maximum has dropped 4 points on the local exchange to 87-89; otherwise values have been practically stationary.

An examination of the stock list brings to light some curious contradictions. For example, there is little to choose on the question of security between the Companies shown in the following list, and they are all paying 5 p.ct. dividends. It will be noticed, however, that the quotations vary considerably:

	Middle Quotation.
Aldershot 5 p.ct. maximum	72½
Bristol 5 p.ct. maximum	88
Croydon maximum dividend	82½
East Hull ordinary 5 p.ct.	74
Northampton 5 p.ct. maximum	77½
Portsmouth 5 p.ct. maximum	81½
Southampton 5 p.ct. maximum	78½
Uxbridge 5 p.ct. preference	87½
Wandsworth 5 p.ct. preference	89½

There is possibly a certain amount of justification for the last two stocks standing at a higher price than most of the maximum stocks on the list by reason of the magic word "preference," but, on the other hand, anyone with a knowledge of gas affairs will realize that the difference in the value of the security is not very great. The remaining stocks with one exception are all 5 p.ct. maximum stocks, and there would appear to be no justification for the value of the Aldershot stock being as much as 15½ points below the value of the Bristol stock.

It is in the stocks of companies operating abroad that opportunities for speculation have occurred. The Imperial Continental capital stock heads the list of those companies which have appreciated, with an increase of 145 points over a year ago; the quotation being 330-350,

as compared with 195-205 on Dec. 31, 1928, 143-146 in 1927, and 129-132 in 1926, or an increase of 210 points in three years. Wide fluctuations have taken place during the year. Standing at an average quotation of 215 on Jan. 4, the value rose rapidly to 420 on Feb. 22, and, after moving up and down, gradually increased to 460 on May 10. This was the highest average attained during the year, but transactions were much wider; the lowest being 195 and the highest 495. Since May last, though there have been spasmodic jumps at intervals, the average quotation has gradually come down to 340.

The Primitiva £1 shares have also shown extensive fluctuations; and though the present quotation at 26s.-29s. only shows an increase of 1s. over that at the end of last year, the shares have been dealt in during the year at as high as 39s. 9d.; latterly, however, transactions have been very few for this class of stock. Montevideo ordinary stock has steadily improved during the past three years. Standing at 79-82 on Dec. 31, 1926, there was an increase of 10½ points during 1927, 5 points in 1928, and 8½ points in 1929—a total of 24 points. The Cape Town £1 shares, European £10 shares, and Malta and Mediterranean £5 shares have also shown slight improvements on the year; but Bombay £1 shares have declined 4s., doubtless due to the reduction of 1 p.ct. in the dividend from 8 p.ct. to 7 p.ct., and Colombo £1 shares have depreciated 2s.

Debenture stocks, in common with most of the ordinary stocks, have depreciated slightly, but, with the exception of British 4 p.ct., the South Metropolitan 3 p.ct., and Wandsworth 5 p.ct., which have fallen 4½ points on the year, there has been no reduction of importance. On the other hand, Imperial Continental 3½ p.ct. has appreciated 4½ points.

During 1929, the country has passed through the throes of a General Election, and has been subjected to a high Bank rate (now fortunately reduced to a more hopeful figure), and except in cases of urgent necessity it was not, until the latter part of the year, considered an opportune time for raising fresh capital. It is interesting to note, however, how great the demand is for gas stocks, as is evidenced by the large over-subscriptions to most of the issues. The principal issues during the year of stock quoted on the London Stock Exchange were:

£524,000	Imperial Continental Gas Association at £200 p.ct.
£110,000	Aldershot 4 p.ct. preference at 70 (minimum).
£64,000	East Hull 5½ p.ct. perpetual debenture at par.
£38,220	North Middlesex 6 p.ct. consolidated at £112 (minimum).
£33,700	Uxbridge 5 p.ct. perpetual debenture at £90 (minimum).
£20,000	Do. ordinary stock at par.

There were also many issues in respect of stock not quoted on the exchange, including:

£35,000	Bognor new consolidated at 102 (minimum).
£25,000	Reading 5½ p.ct. ordinary at 97.
£25,000	Do. 5 p.ct. redeemable preference at par.
£25,000	Tunbridge Wells sliding scale at 106.
£15,000	Do. 5½ p.ct. perpetual debenture at par.
£21,500	Guildford 5 p.ct. perpetual debenture at 91.
£17,500	Rugby 6 p.ct. redeemable debenture at par.
£16,000	Seaford £1 ordinary shares at par.

There have been a number of variations in the list of stocks appearing in these pages. The following is a list of those added during the year:

£392,000	5½ p.ct. redeemable stock of the Metropolitan (of Melbourne).
£396,160	5 p.ct. maximum ordinary of the Northampton Company.
£179,014	ordinary stock
and £67,828	5 p.ct. debenture } of the Sutton Company.

Most companies are compelled at intervals to make additional issues of stock in consequence of the increasing demands for gas; and it may be as well to draw the attention of Directors to the advisability of making application to the Stock Exchange for the inclusion of such additions to the amounts quoted. There are at the present time several companies in respect of which the amount of stock quoted is below the amount shown in the particular company's accounts. It is also a curious fact that there are quite a number of important companies whose stocks do not appear at all on the London Stock Exchange List. This possibly indicates that a large local interest makes it unnecessary, but there is little doubt that more publicity would lead to higher values. Among these companies may be mentioned the Bath, Eastbourne, East Surrey, Oxford, and Rochester.

Buy British.

We should be doing less than our duty if we did not give prominence to a circular which the Minister of Health has addressed to local authorities, drawing their attention to the desirability of making use to the utmost extent practicable of goods and materials of home production. The circular states that such a policy is especially important at present, when the Government are exploring every avenue and making every effort to assist in the reduction of unemployment. It has been laid down as a condition precedent to grants given because of unemployment that all materials required for assisted works shall, so far as practicable, be of United Kingdom origin, and all manufactured articles shall be of United Kingdom manufacture, subject, however, to such exceptions as the Government Department or Committee concerned may find necessary or desirable in any particular case, having regard to all the circumstances, including the comparative prices of British and foreign articles. The desirability of applying the same principles in the case of all contracts entered into by local authorities, whether or not they are in respect of services which are aided by Exchequer grants, has previously been brought to the notice of local authorities; and the Government again urge the importance of this policy. Where there is no alternative to purchasing material from abroad, local authorities are asked to give preference to goods and materials of Imperial origin. We read this circular with a mixed feeling of pleasure at its appearance and of regret that its drafting should have been necessary. A thought which strikes us is how badly politics are apt to wear when exposed to the friction of plain, hard economics.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Jan. 9.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in the Council House, Birmingham. Address by Prof. F. W. Burstall, Vice-Principal, Birmingham University, on the "Present Position of the World's Fuel."

Jan. 11.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Joint meeting with Eastern District at Edinburgh. Address by Mr. H. J. Toogood, of Elland.

Jan. 11.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—See Western District.

Jan. 11.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting at Bristol. Paper by Mr. M. Barash, of West's Gas Improvement Company.

Jan. 11.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Wandsworth Works of the Wandsworth, Wimbledon, and Epsom District Gas Company.

Jan. 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Committee.

Jan. 14.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

Jan. 16.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

Jan. 18.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Bradford. Paper by Dr. J. A. Sugden (Leeds University) on "Refractories."

Jan. 25.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Meeting in Glasgow. Paper by Mr. Alex. Tran, of Helensburgh, "Some Notes on Ferro-Concrete." Also, Mr. A. McFarlane will read his Thesis which gained the Diploma of the Institution of Gas Engineers.

Jan. 30.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in Birmingham. Paper by Mr. C. Featherstone Hammond, of Messrs. Submerged Combustion, Ltd., on "Submerged Combustion."

Jan. 31.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. G. Percival on "Horizontal Retorts."

Institution of Heating and Ventilating Engineers.—On Wednesday next, Jan. 8, at 7 o'clock, Mr. C. A. Masterman, B.A., A.I.C., of the Gas Light and Coke Company, will read a paper on "Combustion, Wind, and Flue Equipment." The meeting will be held at Swedenborg Hall, 20, Hart Street, Bloomsbury, W.C. 1.

Personal.

PRESENTATION TO MR. AND MRS. J. W. BUCKLEY.

An interesting ceremony took place at the Hornsey Gas Company's works in Clarendon Road, Hornsey, on Friday evening, Dec. 20, when the staff and employees honoured Mr. J. W. Buckley, M.Inst.C.E., on his completion of 21 years' service as Engineer and General Manager to the Company. Two men, each with a record of 45 years with the Company—Mr. G. Barker and Mr. R. Webster—presented a gold cigarette case to Mr. Buckley and a dainty hand-painted ivory clock to Mrs. Buckley. Nearly 300 staff and workmen gathered in the mess-room, and the Men's Committee for the Company's Co-Partnership Scheme had a place of honour. Appreciation of Mr. Buckley's concern for the welfare of the workers was expressed.

Mr. BUCKLEY, in thanking the workers for their gifts, said the Company held a remarkable position in Greater London, and they were able to satisfy their shareholders and their consumers in quality as well as quantity. He acknowledged the way the workers had pulled with him to get this result, and said that one of the crowning achievements of the Company was their Co-Partnership Fund. This had been established five years, and the total amount of the fund was now £13,500, which was exclusive of £2000 which had been paid from it. The smallest amount paid out was 7s., and the largest was £68 8s. 2d. The approximate amount standing to the credit of each co-partner who joined in January, 1924, was £74. Mr. Buckley said that if they continued their good work the scheme could be made a substantial thing for the workers. When their Chairman, Mr. A. M. Paddon, introduced the scheme, he was particularly anxious that men of long standing with the Company should have a nest egg in case of sickness, or on their retirement; and it was most advisable the interest should not be drawn out.

Mrs. BUCKLEY returned thanks for the gift.

PRESENTATION TO MR. C. G. BARRETT.

A large number of the officials and workmen of the Hartlepool Gas and Water Company gathered in the Recreation Room at the Waterworks on Saturday, Dec. 21, when a presentation was made to Mr. Charles G. Barrett, Chief Works Assistant, who is leaving the Company to take up an appointment as Engineer, Manager, and Secretary to the Gas and Water Undertaking at Devizes.

Mr. L. M. Weldon, the Company's Distribution Superintendent, presided, and in calling upon Mr. J. R. Bradshaw, the Engineer, Manager, and Secretary of the Company, to make the presentation, spoke of the regret they all felt at the loss of Mr. Barrett, and of the esteem in which he had been held during his long service with the Company. "It is," he said, "over twenty-five years since Mr. Arthur Barrett told me that his son was coming to the Gas and Water Company. During the whole of that period Mr. Barrett has been my closest colleague and my closest friend; and his absence will be felt by all, particularly by myself."

Mr. J. R. Bradshaw, the Engineer, Manager, and Secretary, then asked Mr. Barrett to accept a pipe, an attaché case, and a wallet containing treasury notes—gifts from the Directors of the Company and 229 subscribers. At the same time, he wished Mr. Barrett every success in his new appointment. Mr. Bradshaw thought the Corporation of Devizes could congratulate themselves on having obtained in Mr. Barrett a man of first-class abilities and real human sentiments.

The good wishes of the workmen and staff were expressed by Mr. E. Randall and Mr. S. F. Sainty respectively.

In replying, Mr. Barrett said how greatly he appreciated all that had been said and done.

After 34 years' service with the Lea Bridge District Gas Company—during which the output of gas has increased from 90 million to 1000 million c.ft per annum—Mr. F. W. CROSS, M.Inst.C.E., has retired. Early in 1926 Mr. Cross retired from the position of Engineer (being succeeded by his son Mr. D. C. Cross, Assoc.M.Inst.C.E.), but retained the post of General Manager. As from Dec. 31 last Mr. F. W. Cross wholly retired from his executive office; and in appreciation of his service to the Company he has been elected to a seat on the Board of Directors.

The engagement is announced of Mr. WALTER T. DUNN, M.I.Mech.E., F.C.I.S., ex-Secretary of the Institution of Gas Engineers, and Miss Florence Price, Chief Engineer's Department, Charing Cross Electricity Supply Company, London.

Alderman J. R. BARLOW has been re-elected Chairman of the Accrington District Gas Board.

The Directors of the Newmarket Gas Company, Ltd., have elected Mr. J. H. TROUGHTON, J.P. (Manager of the undertaking for the last forty years), as Chairman of the Company, in the place of the late Mr. Robert Stephenson. Mr. Troughton will continue to act as Manager and Secretary.

The Directors of the Liverpool Gas Company have appointed Mr. J. SANDON STUBBS Secretary of the Company, in succession to the late Mr. Theodore Garnett. Mr. Sandon Stubbs is at present Treasurer, and will now hold the dual office. An old boy of the Liverpool Institute and a native of Liverpool, Mr. Stubbs has spent the whole of his business career with the Liverpool Gas Company, which he joined thirty-six years ago as a junior clerk. He is a member of the Liverpool Rotary Club Council, and is on the Executive and Finance Committees of the Liverpool Organization. He is also a member of the Executive and Finance Committee of the British Commercial Gas Association.

Mr. WILLIAM MATHIESON, Director and General Manager of Messrs. Wilsons & Mathiesons, Ltd., Scotch Foundry, Armley, Leeds, retires from the managerial position to-day on the completion of exactly 66 years in the foundry trade. He is succeeded by his son, Mr. William Mathieson, who has become General Manager of the three associated undertakings—Wilsons & Mathiesons, Ltd., Scotch Foundry, Armley (general light castings); Wilsons & Mathiesons, Ltd., gas stove department, Carlton Works, Armley; and the London Scottish Foundry, Ltd., Barking. Mr. Mathieson, sen., remains Chairman of the Company. He began his foundry work in 1864 at the Carron Ironworks, Falkirk, under his uncle, Mr. Malcolm Coburn. He received training and experience in various foundries and also at the University of Glasgow. Eventually becoming proprietor of the Vulcan Foundry (subsequently known as the Springfield Foundry), Falkirk, he developed so extensive a castings product for the gas stove works of Charles Wilson & Sons, Leeds, that he ultimately transferred to Leeds and established the firm of Mathieson, Wilson, & Co., which later, by a complete combination of the two undertakings, became Wilsons & Mathiesons, Ltd., as at present. The three undertakings now controlled by the Company employ some 1100 people.

Mr. J. H. CORNISH, who has been Secretary, Engineer, and Manager of the Bridgwater Gas Light Company since the retirement of his father in 1904, was at the last meeting of the Directors of the Company unanimously elected a Director in the place of the late Alderman F. C. Foster. At the same meeting he was subsequently made Managing Director of the Company. Since Mr. Cornish has been Engineer of this undertaking, the yearly output of gas has risen from 68 to 130 millions, and the make of gas per ton of coal carbonized from 9500 to 18,000 c.ft., largely due to the early adoption of vertical retorts. At the same meeting Mr. J. H. Cornish, jun., was appointed Secretary of the undertaking, retaining also his present position as Works Manager.

Mr. C. C. S. FOOKS, the present Chairman of the Grays and Tilbury Gas Company, has been elected to a seat on the Board of the Gas Light and Coke Company, as from Jan. 1.

Obituary.

JOHN PETTY LEATHER.

At the autumn meeting of the Institution of Gas Engineers, a letter was read from Mr. J. P. Leather, of "Pendle," Sollershott East, Letchworth, in which he regretted his inability to attend, owing to the fact that he had been knocked down by a motor-car, and was suffering from a compound fracture of the right leg, in addition to minor bruises. Last Friday brought us the sad intelligence that he had passed away at Letchworth Hospital on Christmas Eve.

Mr. Leather, who, at the time of his death, had reached the

Mr. J. P. Leather.

age of 70, was for many years Gas Engineer and Manager to the Burnley Corporation, an appointment in which he succeeded his father in 1889. In 1923, he tendered his resignation to the Gas Committee; and in recognition of his services in reporting upon and preparing plans for new gas-works, the Committee decided to recommend the Council to grant him an honorarium. On leaving Burnley at the beginning of 1924 to reside at Letchworth, Mr. Leather was the recipient of handsome gifts from the employees at the Burnley Gas-Works, as a mark of the affection and esteem in which he had been held during his long service there.

Mr. Leather was for several years the Chairman of the Refractory Materials Research Committee of the Institution of Gas Engineers and the Society of British Gas Industries, a position in which he has been followed by Dr. H. G. Colman. Mr. Leather's work in this connection, as well as in various other directions, has left the industry under a debt of gratitude to him. In 1918 he was President of the Manchester District Institution, and in 1924 he was elected a member of the Institution of Civil Engineers. He was also a Fellow of the Chemical Society.

The death is announced, at the age of 87, of Mr. LOUIS PENNY, M.Inst.C.E., who was one of the foremost Consulting Gas Engineers of his day. Following his father's profession, Mr. Penny in early life became Engineer and Manager of the Gas-Works at Oporto, and later at Para, Brazil. In 1881, he was appointed Engineer and Manager of the Bombay Gas Company, a position he held until his retirement in 1898. In 1902, he was elected a Director of the Company, which position he resigned three years ago, for reasons of health.

Correspondence.

[We are not responsible for opinions expressed by Correspondents.]

Waterless Gasholder Sealing Arrangement.

SIR,—I read with much interest the waterless gasholder sealing arrangement illustrated on p. 770 of your issue for Dec. 18, and am quite in agreement with the statement that the design is simple in character.

The illustration of the seal (fig. 2) is rather too small to see exactly the strength of the webbing or diaphragm, which latter, in my opinion, would need to be of an exceptionally strong character to stand the pressure and the wear and tear over a period of years.

The idea of being able to use water for giving the requisite pressure of the rubbers on the surface of the shell seems to be greatly preferable, however, to the messy tar, which appears to be the rule in present arrangements; and the fact of being able to regulate the pressure within certain limits will no doubt be found useful in varying conditions.

I notice that an oil is used, and the space between the two rubbers is connected by pipes to overhead tanks. It occurs to me whether the higher level of the lubricating oil and the consequent higher pressure obtaining between the two rubbers will interfere in some degree with the working of the seal by reason of the water level being lower.

The vital matter about the arrangement, however, appears to me to be the diaphragm; and if a material of a very flexible and strong character is provided for this point, I think the sealing arrangement should be very effective, and quite an advance on present methods. There is, of course, no finality in anything, but no doubt in due time a type of waterless gasholder will be produced which will be as economical and satisfactory in practical use as any other type of holder.

"AQUALESS."

Dec. 30, 1929.

"Bread Upon the Waters."

SIR,—Your interesting paragraph "Bread Upon the Waters" ("JOURNAL" of Dec. 18, p. 765) should prove a timely reminder to those areas not already sufficiently alert in the distribution of "A Thousand-and-One Uses for Gas," one of the brightest and best edited publications of its kind. In Halifax, known over a wide field for its municipal enterprise, and especially for its very successful gas undertaking, we have for many years regularly displayed in our central and branch libraries the publication referred to, along with a variety of other technical journals; and we believe that in so doing we are helping the public to a greater understanding and appreciation of the social services provided.

We also display the periodical publication of the local electrical service and the Council minutes of the Corporation, all of which are extensively perused, together with the monthly Journal of the Health Department entitled "Better Health." In the latter case we receive a quantity of copies for free distribution, every one of which is taken and read each month. In addition, 2000 copies of our "Readers' Guide," the cost of which is covered by advertisement revenue, are circulated *gratis* monthly. In other directions, also, our public libraries are co-operating in a social, technical, and educational endeavour, and with most gratifying results.

It may also interest you to know that the literature of the gas industry—in book form—is well represented and used in our libraries, the whole of which are organized on the open access system, and allow the freest access for inspection and comparison of the resources of the shelves.

EDWARD GREEN,
Chief Librarian.

County Borough of Halifax.
Dec. 20, 1929.

Presentation to Mr. Dunn.

SIR,—May I be allowed through the medium of your columns to convey to the members of the Institution of Gas Engineers the expression of my sincere appreciation of their goodness in making me such a handsome presentation on the occasion of my retirement from the position of Secretary.

I have been away in South Africa and Japan during the past six months, and before going was closely occupied in preparations for my extended tour; otherwise I should have written this letter before sailing.

Though no longer Secretary of the Institution, I continue to take a very keen interest in its affairs, and may add that, if it is considered by the Council that I could serve them in an honorary office, I shall be willing to place my best services in that respect at their disposal.

WALTER T. DUNN.

72, Elphinstone Road,
Hastings, Dec. 30, 1929.

In To-Day's "Journal."

A New Feature.

It is our pleasure to-day to wish all readers "A Happy New Year," and to express the hope that changes introduced for their convenience in the make-up of the "JOURNAL" will achieve this object. Though subscribers must find it necessary ultimately to go solidly through the pages of each issue, it is realized that many may be too busy to do so at once, and that, in such time as is immediately at their disposal, there is risk of something which they would wish to see being missed. To reduce the chance of this happening, there has been inaugurated a page in which an indication will be given of the main features of each issue—thus facilitating reference. Personal paragraphs, &c., being in a regular position towards the front of the paper, are, of course, instantaneously available; and some of the more important news items will in the same way be brought forward, so that they may not escape notice.

* * * *

Correspondence.

Expressions of opinion forwarded by readers for publication are welcomed, particularly when permission is given for them to appear over the names of the writers. There are, of course, instances in which anonymity is advisable, and others in which it is necessary; but occasionally the absence of a signature rules-out a letter either because its value is thereby destroyed or because its publication in these circumstances would be unfair. A position of greater prominence will henceforth be reserved for correspondence; and it would now and again prevent misunderstanding if writers addressing to the Editor communications which they wish to appear would mark them "For publication."

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The Full Reports.

Full reports of papers, discussions, meetings, and miscellaneous matter, will be found on the later pages. Contributions to Association proceedings do not tend to become either fewer in number or shorter in length; and the satisfactory treatment of them still remains our greatest problem. It must, however, be obvious that the increased space which will be occupied by these alterations to the "JOURNAL" will demand corresponding curtailment in other directions; and in respect of anything that may come under the guillotine, we would tender our apologies in advance.

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Second Reading of the Coal Mines Bill.

Moving in the House of Commons the second reading of the Coal Mines Bill, the President of the Board of Trade frankly admitted that gas undertakings must expect to pay more for their coal. Mr. Winston Churchill congratulated Mr. Graham upon his frankness, but pointed out that the great public utility services are "to become the instruments of a new private tax collection for the benefit of one section of the community." The Marquess of Hartington expressed the belief that the gas industry is on the eve of great expansion, but everything depends upon an abundant and continuing supply of cheap coal.

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Gas Industry and the Coal Bill.

Sir David Milne-Watson, in a letter to "The Times," with reference to the proposals of the new Coal Bill, points out most emphatically that the gas industry is not prepared willingly to acquiesce in a statute-blessed increase in the price of coal. On the contrary, the industry is determined now and hereafter to resist every endeavour to establish an artificial minimum price level for inland coal, or to fix a price in respect of coal sold to public utility undertakers higher than that charged to other users.

* * * *

Gas Poisoning Committee.

Mr. Albert Stokes, Joint Manager of the South Metropolitan Gas Company, has given evidence before this Committee. It is indicative of the great care exercised by our industry to prevent any type of accident in the use of gas appliances. Witness suggests that the Institution of Gas Engineers or the National Gas Council, or both, might draw up general specifications for the fixing of gas apparatus, and that the Board of Trade ought to be authorized to give gas undertakings more power to deal with defective fittings and to take steps to prevent escapes.

* * * *

Street Lighting.

"To take surface brightness as a standard seems to me to be specifying not the street lighting of a city, but the city itself. You would require to say that the road surfaces of that city shall have a high light reflecting value; the buildings thereof shall be white, and the inhabitants thereof shall be arrayed in dark clothing; or, alternatively, the buildings shall be dark and the inhabitants arrayed in light clothing. The black bowler hat should then be forbidden; blessed would be the man who wore a panama." This extract is from a contribution by Mr. J. F. Colquhoun. He deals comprehensively with the British Standard Specification for Street Lighting, and with the important subject of glare.

* * * *

Tar for Roads: Increasing Popularity.

Recently Mr. W. E. Cone, Technical Adviser to the British Road Tar Association, read a paper entitled "Development of Tar Roads in Great Britain" before the German Road Tar Committee in Berlin. Our extract contains useful figures showing that, out of a total of 654 miles of roads to be surfaced, and for which Government grants were made during 1928-29, tar road construction, in one form or another, will be responsible for 500 miles of the new surfacings. Mr. Cone's observations on the functions of mineral fillers are indicative of the development in the technique of the application of tar to highway purposes.

* * * *

An Amalgamation Scheme.

The shareholders of the Cheltenham Gas Company have agreed to an application to the Board of Trade for a Special Order authorizing amalgamation with the Tewkesbury and Winchcombe Gas Companies. The scheme has been drawn up by the Board in consonance with the prevailing tendency for undertakings of substantial dimensions and increasing capacity to amalgamate with smaller concerns which would otherwise require further capital in order to meet the needs of their districts.

The 40-Ton Wagon in Action.

Two hundred leading coal-owners, colliery officials, and representatives of the gas and electrical industries were present at a demonstration at Stonebridge Park, Middlesex, on Dec. 20, of the fleet of 40-ton wagons recently introduced by the L.M.S. Railway, and of which particulars and principal dimensions were given in the "JOURNAL" for Nov. 6 last, p. 400.

Thirty wagons of this type, designed by Mr. E. J. H. Lemon, the Company's coach and wagon superintendent, are now employed each week in conveying coal from the Shipley Collieries, Derbyshire, to Stonebridge Park, which consumes some 2500 tons of coals in twelve days.

They are the only wagons of this capacity at present running regularly on any British railway system, and the Company are well satisfied with the results of their operation, inasmuch as they involve the haulage of a lower dead weight for the tonnage of coal carried (the tare of each 40-ton wagon is 17 tons), and because a train of ten wagons conveying 400 tons of coal can be unloaded by five men in half an hour.

Each wagon is divided into four equal compartments, the bottoms of which are so inclined that, when the unloaders release the retaining pins, the contents are automatically discharged. It is claimed that the wagons would revolutionize the system of transporting export coal from pit to port; discharge from truck to hold at the dockside being performed by electric grabs and hoppers feeding belt conveyors, instead of the present system of hoists and tips.

The minerals department of the Company are prepared to loan the wagons to any colliery wishing to experiment with them, and information is now being sought from the collieries as to the extent to which they possess screens sufficiently high to load them. At present, however, there are very few British collieries equipped with suitable screens.

At a luncheon which followed the demonstration, Mr. ERNEST WHARTON, the Mineral Manager of the line, raised an important point when he said that unless the railway companies could do something to cheapen their transport costs, the present level of prices was bound to be raised, but that the increased use of the 40-ton truck would involve a cheapening of transport costs, and would mean that prices could stand at their present level.

Among those attending the demonstration was Mr. W. B. McLusky, representing gas interests at Halifax.

Gas Concerns and the Price of Coal.

Statement by Sir David Milne-Watson.

In "The Times" for Dec. 23, Sir David Milne-Watson, in a letter, expressed the view of the gas industry in regard to the proposals of the new Coal Bill: In view of the statements that have been made both inside and outside Parliament to the effect that public utility undertakers are prepared willingly to acquiesce in a statute-blessed increase in the price of coal, I feel it my duty to make clear beyond question that the gas industry does not so acquiesce. On the contrary, the industry is determined now and hereafter to resist every endeavour to establish an artificial minimum price level for inland coal, or to fix a price in respect of coal sold to public utility undertakers higher than that charged to other users.

Mr. Winston Churchill laid bare the vice inherent in the Bill, namely, the power accorded to the coalowners of levying taxation upon the community. He might have elaborated the point of emphasizing the partiality and caprice with which they will be enabled to levy this taxation. That the coalowners are being given a power of discrimination between different categories of coal consumer is evident. It is not, however, so immediately obvious—but it is nevertheless true—that the coalowners will be enabled to exercise this discrimination in favour of their own products (coal and oven coke) to the detriment of competitive products (gas and gas coke) supplied by gas undertakers.

Those responsible for the conduct of gas undertakings recognize that they have to safeguard the interests of gas undertakers, consumers, and workmen alike. Every consumer of gas—whether for domestic or industrial purposes—and every workman (whose interests are indissolubly bound up with the fortunes of the undertaking he serves) will view with alarm the prospect of the increase in the price of gas foreshadowed in the Coal Mines Bill.

It is my intention to take an early opportunity of making a fuller and more comprehensive statement on the effects of this Bill. In the meantime, I hope that this letter will indicate that the proposals in the Bill are of so detrimental a character to the gas industry that their active opposition is fully justified.

The Cheltenham Amalgamation.

Special General Meeting.

The Special General Meeting of the shareholders of the Cheltenham Gas Company, which was called to give consent to an application to the Board of Trade for a Special Order authorizing amalgamation with the Tewkesbury and Winchcombe Gas Companies, was held on Dec. 12—Mr. SIDNEY WOOD, Chairman of Directors, presiding.

Other proposals before the meeting were (*a*) to increase the capital and borrowing powers of the Company, and (*b*) to change the name of the Company.

Submitting a motion embodying the above-mentioned proposals, the CHAIRMAN said he did so with the utmost confidence. In asking for the authority of the shareholders to take the step implied by the motion, the Board felt they were but doing justice to the Company, and thereby promoting the advantage of the proprietors and the consumers both in their own area and in the areas they were proposing to serve. The Company had arrived at a stage when it was in a position largely to increase its output, and to serve an area far in excess of that within which it was at present restricted by Act of Parliament. Moreover, the Board considered it their duty to move with the times which showed a tendency for undertakings of substantial dimensions and increasing capacity to amalgamate with smaller undertakings where, in order to meet the needs of their districts, an increase of capital would be necessary. In such cases it might be difficult to raise the required capital without the risk of creating unjustifiable incumbrances on their respective businesses.

He then went on to refer in detail to the position of the Tewkesbury and Winchcombe Companies stating that their outputs were respectively 16 million and 4½ million c.ft., and the prevailing prices 6s. 3d. and 7s. per 1000 c.ft.

THE NEW NAME.

Referring to the proposal to change the name of the Company, the Chairman said the Board recommended that the Company should be known as from the date of the amalgamation as "The Cheltenham and District Gas Company."

It had been suggested that they should include in their application powers to enable them to change the system whereby they paid a maximum dividend irrespective of the price of gas, and they had been very much tempted in that direction, but could not see their way to advise such a course at present. They had given the question prolonged and careful consideration. He was at first enthusiastic for such a change, but he could say quite frankly that the more he had examined the two schemes they had had before them (the sliding scale and the basic rate), and the better acquainted he had become with their respective details, the less did he like them. Therefore, he preferred to recommend concentration on the development of the business for the present. They might, however, be sure that the possibilities with a view to an increase in dividends were not and would not be forgotten in the future. From the experience of the last 10 years it was obvious that the demand for their main product was a constantly growing one both in Cheltenham and in the outlying area.

They had a manufacturing plant more than capable of coping with their probable expansion of output for some years, a magnificent site for extension, and an enthusiastic and efficient staff, and in making these proposals they were animated by the desire adequately to utilize their resources, feeling convinced that only by doing so, were they worthily considering the best interests of both proprietors and the public.

Mr. A. S. F. PRUEN (a shareholder) seconded, remarking that the Chairman had left them with very little to say. The fact that the gas industry had a powerful competitor made it necessary for them to put their house in order; and he congratulated the Chairman and all concerned on the energy they had put into the matter. It seemed to him there was nothing to be said against the scheme, but everything for it.

Mr. BULLOCK (a shareholder) characterized the proposal as sound policy; and the motion was carried unanimously.

The CHAIRMAN, thanking the shareholders for their confidence, mentioned that he had heard that the Tewkesbury Company shareholders had that morning passed the necessary resolution for the sale of their assets to the Cheltenham Company.

[Further particulars of the amalgamation were given in the "JOURNAL" for Dec. 18, p. 784.]

Launceston Inaugurates a New Spiral Holder.

Dec. 18 was a memorable day in the history of the Launceston Gas Company, Ltd., when a new two-lift spiral-guided gasholder, which has been erected by Messrs. Willey & Co., Ltd., of Exeter, was handed over to the Company.

The excavation work for the foundation was commenced on March 25 of last year, and is of reinforced concrete, 62 ft. in diameter, and was carried out by direct labour under the supervision of the Engineer and Manager, Mr. J. W. Gibson. The erection of the tank was commenced on Aug. 1. This is constructed of steel plates throughout, and is entirely aboveground, with sufficient space around it to permit of its being painted to its full depth. It is fitted with a balcony 2 ft. in width, which gives lateral stiffness to the tank curb, and provides facilities for inspection and painting.

Considerable difficulties were encountered in coupling to the various holders, and maintaining meanwhile the usual supply pressures; but the work was accomplished without causing any inconvenience to consumers. The whole re-arrangement scheme and plans submitted by the Engineer and Manager were approved by the Directors in December, 1928. Tenders were invited for the erection, and the contract was placed with Messrs. Willey & Co., Ltd., who have completed the work in a very efficient manner, especially considering the abnormal weather conditions that prevailed during the course of erection.

The Mayor (Alderman E. Hicks), the Town Clerk (Mr. Stuart L. Peter), members of the Directorate, and representatives of several gas undertakings in the West of England were present at the brief ceremony at which the gasholder was handed over to the Company by Mr. Thornton Willey, who, speaking on behalf of Messrs. Willey & Co., remarked that he could give the Chairman and Directors of the Company his assurance that they had in the new holder a perfectly good job.

Lecture by Mr. Dunn.—During his visit to Tokyo for the World Power Conference Sectional Meeting, Mr. Walter T. Dunn gave a lecture before the members of the Imperial Gas Association of Japan. His subject was "A Review of British Coal Gas Manufacture and Its Ancillaries." The lecture was delivered on Nov. 4 in the Hall of the Railway Association, Tokyo; Mr. C. Watanabe, the President of the Association, in the Chair.

Development Scheme at Preston.—The Preston Gas Company are embarking on a large development scheme, involving an expenditure of £190,000, at the Lostock Hall Works. The project is under the Development Act, 1929; and the productive capacity of the works will be more than doubled, as it embraces a daily capacity of 2 million c.ft. as a first instalment, with later a further 3 million c.ft. The first unit is rapidly nearing completion, and work on the second unit will be started without delay. The whole scheme is expected to be completed within fifteen months. All the manufacturing operations of the Company will be concentrated at the Lostock Hall premises.

On the Electrical Side.

Gas and Electricity at Newcastle.

There have been some striking passages in the course of the inquiry by the Electricity Commissioners into the prices of current in the northern area covered by the Newcastle-upon-Type Electric Supply Company and their associated Companies. Sir George Lunn (Chairman of the Parliamentary Committee of the Newcastle City Council), cross-examined with reference to a speech which he had made in the City Council, contrasting the absence of a reduction in the price of electricity with the action of the Gas Company, who "again and again in the last few years have put down the price of gas to meet the corresponding reduction in the price of coal," stoutly maintained that they had received much better treatment from the Gas Company than they had had from the Electricity Company. In the first place, he told the Tribunal that he was not aware the price of gas had ever been increased by 166 p.ct. on pre-war rates, while the price of electricity had only gone up 68·4 p.ct. What he did know was that the Gas Company had made substantial reductions, and that they had had much better treatment from that Company than they had had from the Electricity Company. Replying further on the same subject, Sir George refused to accept Counsel's submission that, while gas prices to-day were 60 p.ct. above pre-war, those for electricity were but 53·3 p.ct. higher; but even supposing it to be true, he would still say that the Electricity Company had been unfair in comparison with the Gas Company. Without any desire to urge anything derogatory to the Electricity Company, we may express our satisfaction at this testimony in favour of what we do know to be an admirably administered Gas Company.

Another point worth noting which emerged during Sir George Lunn's cross-examination was that at Hebburn electricity has had to be taken out of some of the poorer-class houses, and that this process is still going on at Whitley Bay, where gas, which is cheaper, is being substituted.

Electricity Commission Returns.

Returns published recently for the Electricity Commission by H.M. Stationery Office (at the price of 12s. net) have presumably much the same purpose as the Board of Trade Returns relating to gas undertakings. They deal with engineering and financial statistics in connection with authorized electricity undertakings in Great Britain; but unfortunately, as is the case with so many of these official statistics, the figures are now much out of date, the period dealt with being the financial year ended March 31 (or May 15), 1928, for public authority undertakings, and the calendar year 1927 for company undertakings. In considering the figures which follow, it must be borne in mind that they relate exclusively to authorized undertakings providing public supplies of electricity in Great Britain. No account is taken of the supplies utilized by railway and tramway authorities and derived from their own generating stations; of the large number of private generating stations established by collieries and other industrial and commercial organizations for the purposes of their respective undertakings; and of cases in which supplies of electricity are given by undertakings established without statutory powers. Of the total supply of electricity by authorized undertakers, approximately two-thirds was provided by public authorities and one-third by Companies; these proportions broadly applying not only to output and sales of electrical energy, but also to capital expenditure, and to the aggregate capacity of the generating plant installed by the respective groups of undertakers. The extent of the development attained by the public supply undertakings in 1927-28 was represented by the following average figures per head of estimated population in 1927: A connected load of approximately 203 watts, a maximum demand of about 85 watts, and the sale to consumers of 158 units per annum. The total capital expended at the end of the period on such development represented an average of over £6 per head of total population; 41 p.ct. being in respect of generation and 59 p.ct. in respect of transmission, distribution, &c. The supply was provided by 490 generating stations.

Supply and Consumers.

Over 81 p.ct. of the total public supply of electricity in the year 1927-28 was sold to consumers; the remaining 19 p.ct. being accounted for by the works requirements of the undertakers themselves, and by losses in transmission and distribution, &c. Power supplies accounted for about 65 p.ct., lighting and domestic supplies for 24 p.ct., and traction supplies for about 9 p.ct. of the total units sold to consumers. The sales of electrical energy for lighting and domestic purposes increased by 264 million units, and the sales for power purposes by 770 million units. At the end of the year named, there were approximately 2,668,000 consumers of electricity. Of these about 1,891,000 were supplied by public authorities, and 777,000 by companies. Nearly 8,000,000 tons of coal and coke were used. Direct employment on generation, distribution, and administration was given to nearly 52,000 staff and workmen.

Development of Tar Roads in Great Britain.

By W. E. CONF, Technical Adviser to the British Road Tar Association.

[From a Paper before the German Road Tar Committee, Berlin, Dec. 18, 1929.]

To summarize the present position, it would seem from road experience, particularly from that of the surface tarring of roads, that the modern trend of opinion is emphatically favouring the use of more viscous tar than hitherto, and it seems probable that, with further experience, tars of even higher consistency will be demanded. It is evident, therefore, that one of the tasks which will necessarily occupy the tar industry is that of keeping a careful watch on the results obtained from the use of the proposed standard tars, and, by the experience gained, endeavour to improve upon them.

With the realization that traffic on the mileage of roads in Great Britain would never justify expensive forms of construction on all roads, it is necessary to have judicious expenditure in order to conserve existing roads and to provide the increased mileage of roads to keep pace with transportation demands. In this respect, tarmacadam is of almost universal application, and, as the nature of the materials and the methods of construction result in a granular surface that eliminates skidding, tarmacadam, given adequacy of foundation, is one of the most effective forms of road surfacing which the demands of mechanical transport have evolved.

The salient features of progress in tarmacadam manufacture are the use of higher consistency tars and a more uniform grading of the aggregate. In addition, a greater amount of attention has also been given to the relationship which exists between tars of varying consistency and mineral aggregates of differing physical characteristics. In considering this question of the improvement of tarmacadam, a study and interpretation of the records of the density and growth of traffic reveal the need and indicate the necessity for a more wholehearted appreciation and utilization of well conducted scientific research, to solve the problems of the future. The results of the advancement so far achieved show clearly the increased resistance of properly balanced mixtures of tar and aggregates to deformation or internal displacement under such stresses as are imposed upon the tarmacadam surfacing by heavy traffic conditions. The modern tendency is to produce a more dense surfacing, characterized by a much smaller proportion of voids than in ordinary tarmacadam. In this connection, experience has shown the desirability of incorporating with the coarse and medium aggrgates suitable quantities of mineral filler. The stability of the mixture increases as the voids in the aggregate decrease, provided the proper amount of tar is used. Though the function of a mineral filler is generally regarded as being entirely mechanical, indications point to the fact that the nature and surface structure of the mineral filler particles may play an important part in the effect they produce upon the tar

Major Improvements (Involving the Widening of the Highway) and New Roads for which Grants were Made During 1928 1929.

—	Existing Roads.	New Roads.	Total.
	Miles.	Miles.	Miles.
Tarmacadam	277·09	9·95	287·04
Tar grouting	93·89	0·19	94·08
Water bound surface tarred	117·59	2·15	119·74
	488·57	12·29	500·86

when in combination. It may be possible, with a greater knowledge of the stabilizing value of different mineral fillers, to evolve certain forms of construction with the maximum amount of stability and durability, by combinations of mineral aggregates and mineral fillers of entirely dissimilar properties, and, by thoroughly and uniformly mixing with tar, ensure the necessary properties to prevent displacement under heavy traffic conditions.

The steadily increasing popularity of road tar is evidenced by the general trend of policy on the part of Highway Authorities in Great Britain towards the adaptation of their roads to the requirements of modern traffic by the use of tar, either as a surface dressing or as a road-surfacing material. This significant feature is brought out in the following figures extracted from the Report on the Administration of the Road Fund for the year 1928-29.

The length of existing roads to be improved under these grants is about 600 miles, while the length of the new roads to be completed is nearly 54 miles. From this it will be seen out of a total of 654 miles of roads to be surfaced, tar road construction, in one form or another, will be responsible for 500 miles of the new surfacings. It will be recognized that the modern expansion of motor transport has been of such rapid growth that the reconstruction or adaptation of roads has followed a long way after the traffic has created a demand, and thus the modernizing of road surfaces is progressing slowly. The availability and adaptation of road tar will be of increasing importance in making up the arrears.

Gas in Singapore.

By WALTER T. DUNN, M.I.Mech.E.

As soon as the N.Y.K. " Wakasa Maru " had been made fast to the quay at Singapore on the afternoon of Oct. 11, one of the first persons to come aboard was Mr. F. Bedford, the Municipal Gas Engineer, to give me greeting.

It was in March, 1914, that Mr. Bedford first went to Singapore, and it was to erect an installation of vertical retorts for Messrs. R. Dempster & Sons, of Elland. In 1922, he received the appointment of Chief Assistant to Mr. J. P. Allaway; and in 1925 he became Municipal Gas Engineer, on Mr. Allaway's retirement after 23 years' service at Singapore.

F. Bedford,
Municipal Gas Engineer at Singapore.

Gas manufactured last year in Singapore amounted to 348,446,000 c.ft. At the present time the rate of production is 396 million c.ft. per annum. Gas sold for private consumption totalled last year 186,610,000 c.ft.—an increase of 11·5 p.ct. over that for 1927. It was, by the way, also the largest amount sold for private consumption in the history of the undertaking.

The price of gas is 4s. 1d. per 1000 c.ft. for public use, and varies from 4s. 8d. to 5s. 10d. for private consumption. Gas unaccounted for last year was 10·4 p.ct. of the gas manufactured, which works out to about 240,000 c.ft. per mile of main. As there are about 150 miles of main—laid in many places through swampy ground—the unaccounted-for gas may be regarded as very low.

The cost of coal at the works was £2 0s. 2d. per ton. Australian coal was principally used; but owing to strikes in Australia, coal is now being imported from England. Tar is distilled at 300°, 450°, and 500°. In the year 1928, 198,003 gallons were produced. The light oil is used as a wood preservative.

As to gasholders, there are five altogether—four of them being at the works. One is of 40,000 c.ft. capacity; two of 60,000 c.ft. each; and one of 185,000 c.ft. There is also one at Kaeta Ayar, in Chinatown, about three miles from the works, having a capacity of 600,000 c.ft. This is used for advertising, the area facing the water front bearing in English the words " Cook by Gas," and on the area facing Chinatown the same exhortation in Chinese characters. One of the holders at the works is also used in the same way.

Two showrooms have been established; one in a very good position in Orchard Road, in the same block as the European shops, which are comparatively rare in Singapore, and therefore are bound to be visited. There is another fine showroom in the new Municipal Building.

The lamps for the town lighting in the districts of Geylang and Katong are fitted with automatic controllers. In regard to the fittings business, it may be mentioned that the net profits for the year 1928 amounted to £1039 14s. 6d. The net profit made by the Gas Department, after allowing for public lighting at cost, deducting interest on loan, sinking fund, and renewal charges, amounted to £15,994 9s. 6d.

The number of hands employed on the works is 125. In the distribution department there are 270. They are composed mainly of Southern Indians (Tamils, Telegus, &c.), and Chinese, but some Malays are employed, and a few of different Asiatic nationalities. To make provision for future requirements various extensions are now under consideration.

Scottish Junior Gas Association (Western District).

Visit to R. & A. Main's Works, Falkirk.

On Saturday, Nov. 23, over a hundred members of the Association, under the leadership of Mr. Ronald Keillor, the President, visited the works of Messrs. R. & A. Main, Ltd., at Falkirk.

There has been a remarkable extension of the plant. There are additional bays to the foundry, a new core shop, furnaces, tool stamping, chromium plating, railway and motor loading banks, a special department for the testing and assembling of brasswork, and last, but not least, the enamelling plant responsible for the production of the firm's contribution to the brighter kitchen movement—the fully-enamelled cooker.

The party, including several members of the North British Association of Gas Managers, were shown over the works in small groups, and afterwards sat down to tea in the recently completed Welfare Hall adjoining the offices. Here a welcome was extended by the Chairman and Managing Director of Messrs. R. & A. Main (Mr. Kenneth Aird).

Appreciation of the firm's arrangements for entertaining the members was expressed by Mr. Keillor; and reference to Messrs. Main's progress in the manufacture of gas appliances was made by Mr. J. Wilson (Motherwell).

A Sales Record Celebrated.—There was an interesting function at the Royal Victoria Hotel, Sheffield, on Dec. 19, when General Refractories, Ltd., of Sheffield, gave a banquet to their salesmen and executive staff, to commemorate the fact that the sales of October last were a record in the history of the Company. The gathering was presided over by Mr. Frank Russell, Chairman and Managing Director of the Company, who, after dinner, welcomed those present. There was a presentation of prizes to salesmen showing the largest percentage increases in sales.

Commercial and Industrial.

Stock Market Report.

[For Stock and Share List, see later page.]

In the review there is a résumé of Gas Stock transactions during the year; and it will be seen that, while there have been some falls in values, these investments have not depreciated to the same extent as in other markets.

During last week there were only three changes in price, apart from the usual *ex* div. reductions in debenture stocks at this time of the year—viz., a rise of 4½d. in Newcastle £1 stock, and falls of 2 points in Alliance and Dublin to 93-96 and 5 points in Imperial Continental to 330-350. Following the practice of former years, the lowest and highest prices of transactions during the year have been inserted in the Share List appearing on a later page. In most cases the differences have been very small; the following stocks showing the greatest fluctuations:

—	Transactions.	
	Lowest.	Highest.
Commercial	90	102
Croydon sliding-scale	103	114
European	9⅜	25
Gas Light 4 p.ct. preference	70	81
Imperial Continental	195	495
North Middlesex	105	114
Primitiva £1 shares	26s. 1½d.	39s. 9d.
South Metropolitan	99	110
South Suburban 5 p.ct.	100½	111
Wandsworth "B"	114½	130½
" "C" and New.	96	107
" Wimbledon 5 p.ct.	105	120

With few exceptions the lowest prices of transactions are those ruling at the present time; and for this class of investment some good yields are obtainable—viz.:

—	Middle Market Price.	Yield P.Ct. per Annum on 1928 Dividend.
		£ s. d.
Alliance and Dublin	94½	8 1 4
Commercial	92½	6 9 8
Hornsey	85½	6 14 6
Liverpool	91½	6 11 1
South Metropolitan	100	6 5 0
Southampton	78½	6 7 4
Uxbridge	99½	7 0 8

Coal Markets.

As is usual, business on the coal markets was quiet during Christmas week, and, at any rate at the northern centres, there will be little done during the current week, and production will be curtailed by the holiday. Reports from the shipment places show that there has been ample tonnage, and the carry over may tide the collieries over the difficulties which are certain to result from the renewal of bad weather.

A slightly easier feeling has been apparent in the Durham market, but quotations, which have barely been tested for prompt business, are firm and unchanged for January shipment. Wear special gas makes ask 17s. 3d. to 17s. 6d. f.o.b., best qualities (Holmside, Boldon class) 17s., and other sorts 15s. 3d. to 15s. 9d. Approximate f.o.b. prices on the Hull market are 18s. to 18s. 6d. for screened gas and washed trebles; 17s. 6d. to 18s. for washed doubles; and 16s. to 16s. 6d. for washed singles.

Gas coke is reported firm on all markets; 27s. f.o.b. being asked on the North-East Coast, and 25s. to 26s. f.o.b. Hull.

Good demand is anticipated for all classes of coal for the next few months in view of the uncertainty of the position in regard to marketing schemes.

Trade Notes.

Total Gasification at Lerwick.

The Lerwick Gas Company have just changed over from 500 B.Th.U. gas to all Tully gas. They wired Messrs. Tully, Sons, and Co., Ltd., Newark, as follows: "Everything going satisfactorily, and the lighting is brilliant." This firm maintains that there is no gas appliance, burner, or engine, but what can give proper satisfaction with this gas, it only being a matter of adjustment.

Contracts Open.

Gasholder.

The Colchester Gas Company invite tenders for a spiral-guided gasholder, and alternative tenders for a waterless holder. [See advert. on p. 46.]

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 30.

There is little change to report in the tar products market.

Creosote for export is 6¼d. to 6½d. per gallon f.o.b.

Pitch is 47s. 6d. per ton f.o.b.

Pure toluole is 2s. 5d. to 2s. 6d. per gallon; 95/160 solvent naphtha about 1s. 5d.; pure benzole about 1s. 11d.; and pyridine bases about 3s. 9d. per gallon.

Tar Products in the Provinces.

Dec. 30.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 47s. 6d. f.o.b. West Coast (f.a.s.) Manchester, 42s. to 42s. 6d.; Liverpool 45s. 6d. to 46s. 6d.; Clyde, 45s. 6d. to 46s. 6d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3⅝d.; low gravity, 2d. to 2¼d.; Scotland, 3½d. to 3⅝d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 6d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Tar Products in Scotland.

GLASGOW, *Dec.* 28.

There is no alteration to record this week. Refined tar is still in the foreground; but little business has passed within the last few days.

Pitch continues scarce in this district, and prices are firm at 47s. 6d. to 50s. per ton f.a.s. Glasgow, with a premium of about 5s. for home trade.

Tar continues firm, with quotations about 3⅞d. to 4⅛d. per gallon; filled into buyers' packages at works.

Creosote prices continue easy, and business is dull. B.E.S.A. specification is 3¾d. to 4⅛d. per gallon; light oils, 3½d. to 3⅝d. per gallon; neutral oil, 3d. to 3½d. per gallon; all f.o.r. works.

Cresylic is unaltered. Quotations are steady at 1s. 9½d. to 1s. 10½d. per gallon for 97/99 p.ct. pale; 1s. 8½d. to 1s. 9½d. per gallon for 97/99 p.ct. dark; 2s. 1d. to 2s. 2d. per gallon for 99/100 p.ct. pale; and 1s. 11d. to 2s. per gallon for high boiling.

Crude naphtha is quiet at 5⅞d. to 6¼d. per gallon *ex* works naked.

Solvent naphtha.—Quoted prices are unchanged. 90/160 solvent is 1s. 1½d. to 1s. 2d. per gallon, and 90/190 grade is 1s. to 1s. 0½d. per gallon.

Motor benzole is weak at 1s. 5d. to 1s. 5½d. per gallon in bulk quantities.

Pyridine is unchanged at 3s. 3d. to 3s. 6d. per gallon for 90/160 quality.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.			
Crude benzole	0 10	to 0 11	per gallon	at works	
Motor "	1 5	" 1 6	"	"	"
90 p.ct. "	1 7	" 1 8	"	"	"
Pure "	1 10	" 1 11	"	"	"

Overseas Opportunities.

[From the Board of Trade Journal.]

Turkey.

C.I. Pipes, Bends, and Valves.—The Commercial Secretary, H.M. Embassy, Stamboul, has forwarded particulars of a call for tenders by the Administration Générale des Chemins de Fer at des Ports d'Etat for vertical cast-iron pipes, bends, and valves, required for the installation of a water supply at Karafikili Station on the Angora-Caesarea Railway. Firms interested in the supply of British made pipes, &c., can obtain further particulars of this call for tenders upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1. (Ref. A.X. 8922.)

Dissatisfaction of Electricity Charges in Glasgow.—The question of the Glasgow Corporation method of charging for electric light to shopkeepers was discussed at a committee meeting of the Glasgow branch of the National Federation of Newsagents. It was stated that it was becoming increasingly difficult for the average shopkeeper to get any advantage from the rebate allowed, and that, while retailers' hours had been considerably reduced, the Corporation still held to the minimum demand of 600 hours' consumption before the cheaper rate became available. That scale had been fixed 20 years ago, and was in need of revision and reduction. It was resolved to send a requisition to the Town Clerk with regard to the matter, pointing out that shopkeepers were large users of electric power, and that they were entitled to greater consideration.

Notes on New Books.

"COAL CARBONIZATION."*

Reviewed by T. CAMPBELL FINLAYSON, M.Sc.

In his preface, the author explains how he first began the study of coal carbonization by attending lectures, how he then became lecturer and investigator himself, and, finally, how he has compiled the book under review, in which the "main object is to give an outline of the chemistry of coal carbonization as far as it is at present understood from an academic rather than from a technical standpoint."

The methods of the lecturer are to be found in the book; in fact, Mr. Wigginton's volume might well be called "Seven Lectures on Coal Carbonization"—a historical introduction, an interlude, and five technical lectures. This interpretation does not make the book less valuable. It is, on the contrary, one of the best informed and most thoughtful books on the subject which the reviewer has had the opportunity of reading for many years. The author has shown wisdom in the selection of his material by choosing work with which he is best acquainted, and thus there is a predominance of the work of the Sheffield School.

Chapter I. gives a most fascinating summary of the early history of coal carbonization. The reviewer does not know of any other book which presents this aspect of the subject in such readable form. How some of the early protagonists of gas would be welcome to-day! Thus it would be interesting to see Mr. Winsor (1805) giving evidence before the Gas Poisoning Committee (1929) that "he had succeeded not merely in removing the objectionable odour of coal gas, but also in imparting an agreeable smell to it, and he even went so far as to say that doctors were recommending it for inhalation." It was also interesting to read that the very earliest gas engineers were seeking high thermal yields per ton of coal! The Rev. (*sic*) John Clayton (about 1690), working on small-scale gas production by distilling coal in a retort in an open fire, writes "the oil and phlegm (water) descended into the receiver, but the spirit still ascending blew up the bladder. I then filled a good many bladders therewith, and might have filled an inconceivable number more; for the spirit continued to rise for several hours, and filled the bladders almost as fast as a man could have blown them with his mouth; and yet the quantity of coals I distilled was inconsiderable."

Chapter II. is entitled "Later Developments." The reviewer has suggested that this might be termed an interlude. The author describes the chapter as an outline of some of the principal large-scale methods of carbonization, and refers the reader to standard works on carbonization. As an outline the chapter is adequate, but it is less concise, and lacks the same careful choice of matter which characterizes the rest of the book. Possibly this may be termed a "lantern lecture" without the slides.

As a digression, why is it possible in modern scientific treatises for out-of-date blocks to appear? A writer of a book (say) on internal combustion engines in 1929 would not illustrate the Morris Cowley engine by showing a 1914 model. Yet carbonizing plant sections many years old sometimes appear in text-books of 1929. Certainly figs. 3 and 5 in this volume are of ancient vintage.

The remaining five chapters are devoted to certain scientific aspects of coal carbonization. They are distinctive in two or three directions. First, each chapter is a carefully thought-out miniature treatise on the subject dealt with. The author has obviously collected his matter, spread it out in front of him, and then selected. Secondly, the subject-matter is supplied, page by page, with full references to the original worker. Thirdly, these chapters seem to come straight from the pen of a scientist steeped in fuel technology.

Chapter III. deals with the action of heat on coal, Chapter IV. with coal gas, Chapter V. with ammonia and its recovery, Chapter VI. with coal tar, and Chapter VII. with coke—its formation and properties. It is impossible to review, in a few sentences, these chapters. They are so packed full of information that they require most careful study before passing even the mildest comment. Possibly the author of the book will accept as tribute the statement that within the past few days two tables of figures on entirely different subjects have been of great value to the reviewer—information which otherwise would have required much seeking.

As a starting-point for any investigations into the more scientific aspects of coal carbonization, Mr. Wigginton's book is extremely valuable, and should certainly take a valued place on the shelves of any serious student of the subject. It contains in orderly form much information which has hitherto been scattered throughout the transactions of the scientific institutions and the technical journals, and will, therefore, prove of great service as a quick means of reference.

* "Coal Carbonization," by R. Wigginton. Published by Bailliere, Tindall, & Cox, 1929; 287 pages, 47 figures. Price, 21s. net.

GASEOUS COMBUSTION AT HIGH PRESSURES.*

Reviewed by H. J. HODSMAN, M.B.E., M.Sc., F.I.C.

This book may be regarded as a companion volume of "Flame and Combustion in Gases," published from the same source two years ago. It deals with combustion processes at high initial pressures, and in the main with the experimental work initiated by Prof. Bone in 1906, and continued first at the University of Leeds, and later at the Imperial College of Science and Technology, London. Admittedly, the book is mostly concerned with the authors' own work and results, but even then it is a considerable volume.

In an introductory chapter the authors set out to illustrate the new chemistry at high pressures by reference to the synthesis of ammonia and methanol and to high-pressure explosions. The reference to synthesis of ammonia is only incidental to the main purpose of the book, but it may be remarked that the story as given is not an exact historical statement.

The authors then devote considerable space to the equipment for, and technique of, high-pressure research, not forgetting the psychological side, for we are told that this work "should not be attempted except by persons of equable temperament." The fatal accident to one of Prof. Bone's skilled assistants indicates the dangers which must lurk round the inexperienced or unwary.

The new high-pressure laboratories of the Imperial College are described at length, with plans and photographs. Chapter III. deals with the preparation, purification, storage, and compression of gases up to 1000 atmospheres pressure—obviously matter likely to be of great value to anyone embarking on high-pressure work.

Chapter IV., on the compressibilities of gases and their mixtures, gives an historical treatment of the subject, including the recent work on this field of growing importance. This chapter is amplified by tabulated data in the appendix, and summarized by a large chart at the end of the book, showing the deviation from Boyle's Law for all the common gases up to 1000 atmospheres pressure.

Chapters V. and VI. deal with equipment, bombs, fittings, pressure gauges, and the accessories necessary for such work up to the highest pressure. This information will be useful to many people not actually interested in explosions, for few experimenters to-day escape the necessity of using compressed gases. Detailed drawings are given of valves, the methods of calibration and testing are described, and precise instructions for the care and use of such fittings are included.

After an account of the procedure of a typical explosion experiment, the authors pass on to give and discuss the results of their researches, which occupy the bulk of the book. This material is collected from a series of papers which have appeared in the Proceedings of the Royal Society. No detailed account of these is called for here, but it can be said that the experiments deal largely with the peculiar behaviour of carbon monoxide when exploded, with and without admixture of hydrogen, steam, nitrogen, and other gases. Questions of great theoretical interest—and, it may be, of practical importance—are involved. The oxidation of nitrogen in explosions of CO mixtures awakens interesting speculations. The work of Haber and Coates, quoted at length, on the oxidation of nitrogen in steady flames showed that considerable yields of nitric oxide were attainable, and only the greater promise of the ammonia synthesis prevented an attempt at commercial exploitation. Curiously enough the authors make no mention of the parallel experiments of Haber and Wolokitin on the oxidation of nitrogen in the hydrogen flame, though the results lend some support to their theories.

Chapter XX. discusses the effect of increased pressure on the explosion limits of mixtures of gas and air, a subject of obvious practical importance.

The appendix contains valuable and comprehensive data on the properties of compressed gases. It also describes the "Bone-Newitt" gas analysis apparatus—a variant of the more familiar "Bone and Wheeler"—which will interest many who never intend getting above atmospheric pressure in their work. The device of raising the mercury hydraulically will appeal to those who have experienced trouble with mechanical gear.

It will be clear that the book contains not only an account of the methods and results of experiments on gaseous explosions at high pressure made by the authors, but also much information of interest to wider circles. The description of the apparatus and technique will be useful to all who may have used compressed gases. As for the get-up of the book itself, it suffices to say that it is worthy of the publishers.

* "Gaseous Combustion at High Pressures," by W. A. Bone, D. M. Newitt, and D. T. A. Townend. London: Longmans Green and Co., 42s. net, pp. IX. + 396.

Street Lighting.

By J. F. COLQUHOUN, Lighting Engineer, City of Sheffield.

[Paper before the Institution of Electrical Engineers (North Midland Centre), Sheffield, Dec. 18.]

We erect lamps, light and maintain them, in order to make visible the streets and roads in which they are placed; more correctly, to make visible the stationary and moving objects on those roads.

Visibility is obtained on school bench, on office desk, or in the home by light falling on the object—either light from the luminous source itself, or reflected light from walls or ceilings. The recommended intensity of that light is "not less than 5 foot-candles." But in point of fact this intensity is often exceeded.

Recently a test was made in this country on the effect of increasing the illumination in workshops and factories. Type-setting was chosen as the best employment for testing purposes. It was found that the work steadily improved up to an illumination of 20 foot-candles, and this standard has been adopted by a far-seeing and bold minority of type-setters. It has been adopted on strictly economic grounds, because it was found that through the great reduction in the number of errors, and the increased speed of type-setting, the wages bill was reduced between 10 and 20 p.ct.

Tests made by Dr. Luckiesh, Director of the Lighting Research Laboratory of the General Electric Company of America, proved that when the intensity of illumination was increased from 0·4 foot-candle to 4 foot-candles the speed of reading increased 54 p.ct. When the intensity of illumination was increased from 4 foot-candles to 16 foot-candles, the speed of reading increased 15 p.ct.

The greatest intensity of light I have seen in actual commercial work was at the Fisher Motor Body Works, at Detroit, where they had a light intensity of 120 foot-candles on the motor bodies when they were being prepared for finishing.

The minimum illumination in the lowest class (Class H.) of the British Standard Specification for Street Lighting is 0·01 foot-candle. There are many, many streets in this country where the minimum illumination is much below this figure. The problem of the street lighting engineer is therefore to get visibility in a street with a light intensity of 1/500th that considered the minimum necessary to get comfortable vision in school, office, or home.

VISIBILITY BY SILHOUETTE.

In a normal fairly well-lighted residential street you will find that extremely little visibility is obtained by direct light. A person walking along the footpath is seen as a dark silhouette before he passes the lamp, and then by direct light for perhaps five or six yards, after that he is seen by silhouette again until he reaches the next lamp (say) 60 yards away.

It is true that in the higher categories of lighting (say) High Street or Fargate (Sheffield), a greater proportion of visibility is by direct light, but even there vision by silhouette is much the greater. The majority are seen as dark objects against a light background; a lesser number as light objects against a dark background; and a small minority by direct light falling on them and showing detail, colour differences, and so on.

Seeing by silhouette is likely to remain the method in artificially lighted streets; finance dictates it. At the present time Fargate is lighted by 1000-watt lamps 40 yards apart and 25 ft. high. The current consumption is 9·1 watts per linear foot of roadway. To get a minimum illumination of 5 foot-candles the lamp standards would require to be placed not 40 yards, but 20 ft., apart, and to carry 2 1000-watt lamps; the current consumption would be approximately 100 watts per linear foot, as against 9 at present. We must content ourselves, therefore, by getting our visibility by silhouette. The effect depends not only on the intensity of the light you throw on the road surface, but on the amount of light reflected from the road surface, or surface brightness as it is called; and we must so direct our light to get the best angles for that reflection.

CRITICISM OF THE BRITISH SPECIFICATION.

Now this brings us to the British Standard Specification for Street Lighting; the British opinion which upholds the principle on which that specification is based; and to the American and European criticism of it.

The specification is intended to classify street lighting installations. It does not follow that an installation in a lower class is not so good as an installation in a higher class, just in the same way as a 60-watt lamp may be just as good as, or better than, a 100-watt lamp or 1000-watt lamp.

The specification states:

(1) Certain standards of illumination for the various classes or grades.
(2) The minimum height at which the lamps can be fixed for each class.
(3) The minimum height in relation to the distance between the lamps.

There is a recommendation regarding the avoidance of glare, and an appendix giving a method of making an approximate estimate of glare.

Our American and European friends have not much criticism to offer regarding the mounting height of the light sources, or the spacing of the lamps. The recommendations and the appendix relating to glare are of too theoretical a nature to permit of much criticism; but they have a great deal of criticism to offer on our adoption of minimum horizontal illumination as a standard.

At the meetings of the International Commission on Illumination in America last year, I and my colleagues found it necessary over and over again to emphasize that we did *not* accept the classes as standards of excellence or merit. They are, and are intended to be, merely "ratings" or classes according to size in the same way as we classify lamps according to their current consumption, or motors according to their horse-power.

A street lighting installation can be defined in terms of illumination in various ways; for example, (1) the minimum illumination; (2) the maximum illumination; (3) the average illumination. All these measurements could be on the vertical plane, or the horizontal plane.

The minimum *horizontal* illumination is adopted in the British specification. I would like to discuss this, because by so doing we discuss the whole science and art of street lighting. Some of the arguments in favour of minimum horizontal illumination are:

(*a*) It is easily taken at the definite test points laid down by the specification.
(*b*) It can readily be checked from time to time.
(*c*) It ensures that all parts of the street are lighted to any given standard.
(*d*) It lessens, if it does not eliminate, the possibility of harsh contrasts and deep shadows.
(*e*) It tends to increase the mounting height of the lamps and to closer spacing, and thus automatically it helps to reduce glare.
(*f*) The minimum is the weakest link in the chain of street illumination. If you ensure that that is up to any given standard, then the rest is bound to be all right.

The arguments against the use of minimum illumination, or, indeed, of illumination at all, are largely based on the question of obtaining visibility by silhouette, to which I have already referred. The objects are seen as dark against a light background, or light against a dark background; therefore it is said that the more contrasted the lighting the better, and that average illumination forms a better standard. But in order to obtain a dependable average figure a great number of readings must be taken. The more difficult you make a test, the less likelihood is there of that test being carried out, and in practice I find that the average illumination gives me no better idea of the size or quality of an installation than does the minimum illumination figure.

Another argument against the use of minimum illumination as a standard is that it will encourage the use of excessively directive fittings which throw a beam of light along the street giving great uniformity of illumination, but also great and harmful glare. A further objection is that the concentration of light on the roadway would leave the buildings in shadow. Another section of critics say no measure of luminous intensity can be satisfactory, and that it is the brightness of the road surface which tells, and therefore they say, "Let us classify according to surface brightness."

SURFACE BRIGHTNESS OF ROADS.

Mr. A. K. Taylor, of the British National Physical Laboratory, in his paper to the International Commission on Illumination, gives results of tests on the surface brightness of various road materials. Where the variation range for illumination, maximum to minimum, was 16:1, the variation range for surface brightness, when viewed at an angle of 87°, was only 2·2:1 in the case of wood-paving and 3·1:1 in the case of sand carpet. Similar tests from America showed that, where

the illumination range was 46 : 1, the brightness range was only 8 : 1. In other tests for macadam surface the illumination range was 11 : 1, and the brightness range 1·5 : 1.

I have here some coloured strips of paper showing the percentage of reflected light from each colour. From this you will see that white blotting paper reflects approximately 82 p.ct. of the light thrown on it, while dark paper not unlike the surface of Sheffield roads reflects 4 p.ct. only.

To take surface brightness as a standard seems to me to be specifying not the street lighting of a city, but the city itself. You would require to say that the road surfaces of that city shall have a high light reflecting value; the buildings thereof shall be white, and the inhabitants thereof shall be arrayed in dark clothing; or, alternatively, the buildings shall be dark and the inhabitants arrayed in light clothing. The black bowler hat should then be forbidden; blessed would be the man who wore a panama.

The arguments for average illumination are not so easily dealt with. It is true that sometimes an object at the point of minimum illumination is more clearly seen than in any other part of the street. It is true that the distribution of light may be so arranged that at no point is there anything greater than the minimum illumination. It is true that excessively directive fittings do create harmful glare, and that the clauses relating to glare, and the appendix, are recommendations only. But, after all, we wish this specification to be a useful, practical instrument, which, because it classifies and because it can be put into immediate use, will help to raise the standard of lighting throughout the country.

It was in order to test this practicability that we had our demonstration in Sheffield in July of last year. That demonstration proved that it is well nigh impossible to obtain absolute uniformity in street lighting. The most uniform of the fifty lighting systems demonstrated gave 2½ times more light at the maximum point than at the minimum point. The most contrasted gave 62 times more light at the maximum point than at the minimum point. What is the correct balance is a matter of opinion. I myself think there is little likelihood in actual practice of the lighting being too uniform, and that a contrast of more than 40 is to be avoided.

In order to show how difficult it is to get absolute uniformity of lighting in a street, let me give an example. The 60-watt lamps in our new Housing Estates are spaced, on the average, 30 yards apart. The light source is 11 ft. 6 in. high. There is 19 times more light at the maximum point than at the minimum on the kerb. In order to get absolute uniformity of lighting at the same spacing, we would require to put those 60-watt lamps 60 ft. high—obviously an impossible and absurd thing to do.

Prevention of Glare.

The prevention of glare does present a difficulty, and the study of the subject has not progressed far enough in order to allow of definite laws, or principles, being laid down. Indeed, it is difficult even to define what glare is.

Research is being carried out in this country at the National Physical Laboratory, and also in other countries, to see if it is possible to find some means of measuring glare quantitatively. At the session on Glare at the International Commission on Illumination meetings in America, in September, 1928, the following tentative definition was given:

> "Glare is the deleterious effect on the observer of the brighter portions of the visual field."

It was felt that a statement of the various ways in which glare might manifest itself might help those who were to carry out the research. The statement is as follows:

(*a*) In its milder forms it may result in attracting the attention of an observer to the glaring source, and distracting his attention from the object which he would normally view.
(*b*) As the glare becomes more intense, it may produce a sensation of discomfort.
(*c*) Prolonged exposure to such discomfort may produce fatigue.
(*d*) The pupillary aperture may, as a result of glare, be reduced below its normal value for the mean field brightness.
(*e*) Glare may produce a reduction in the ability to perceive objects, up to a point where nothing can be seen but the source of glare.
(*f*) Glare may produce perceptible after-images which interfere with vision.
(*g*) In the most intense forms of glare, injury to the eye may result.

Some of these manifestations of glare may be different degrees of the same effect.

It was recommended that research be carried out:

(*a*) On the relative effects on vision of surface area and brightness of a luminous source.
(*b*) On the relation between angle of cut-off and glare in factory lighting.
(*c*) On the glaring effect of fittings for the lighting of interiors in relation to different surface brightness of the fittings, and to different angular distances from the fixation point.
(*d*) On the application of existing data on glare to the problem of automobile headlights.
(*e*) Directed towards the collection and submission of data with a view to the quantitative estimation of glare, together with the suggestions arising out of the paper contributed by Messrs. Preston S. Millar and S. McK. Gray for the classification of research on glare under the four statements of its principal effects—viz.:
  (1) Decrease in ability to see.
  (2) Ocular discomfort.
  (3) Ocular fatigue.
  (4) Marred appearance.

As will be seen, the research being carried out relating to glare applies to all forms of lighting, not merely street lighting. The resolutions passed at the International Meetings on Street Lighting were:

(*a*) In order to facilitate international comparisons of street lighting installations, to adopt as essential characteristics (1) the average horizontal illumination of the carriageway, and (2) the minimum horizontal illumination on the carriageway, the plane of reference for both shall be the surface of the street.
(*b*) That the Secretariat Committee be asked to study whether it is possible to adopt a generally agreed plane of measurement of street illumination, together with the adoption of a suitable type of portable photometer.
(*c*) That the National Committees be asked to study and suggest to the Secretariat Committee a practical test for defining and measuring the degree of glare and of visibility in street lighting.
(*d*) The Secretariat Committee to prepare a questionnaire for the collection of information on a certain number of public lighting installations representative of modern practice, the information thus collected by the Secretariat Committee to be communicated to the National Committees who have replied to the questionnaire.
(*e*) As an important characteristic of a street lighting installation to give the watts or cubic feet per hour and the generated flux in lumens per linear unit, or unit of surface of the roadway.

(In passing, let me say that the next meetings of the International Commission on Illumination will be held in Great Britain in September, 1931, and the Commission will visit Sheffield, which is a great honour to us.)

Sensitivity of the Eye.

The eye is a most wonderful organ, being able to maintain the same degree of sensitivity, for at least short periods, in illuminations of 1 foot-candle, and in illuminations of 10,000 foot-candles. But it is unable to maintain that sensitivity if it is subjected to violent changes in intensity of light.

In our street lighting, as I have shown, we have illumination as low as, and lower than, 0·01 of a foot-candle, and in these same streets we have motor headlights with a beam of anything up to 30,000 candle-power. In the stretch of roadway, Town Hall to Wicker Arches, and also Church Street, we have particularly well-lighted thoroughfares; and yet I constantly see motorists using their glaring headlights in those streets, and thereby asking the eyes of all pedestrians and other motorists to accommodate themselves to such violent contrasts. There is a good deal of educational work required here. These people are not knowingly selfish. They are just ignorant. Headlights on motor cars are dangerous, not merely on account of the intrinsic brilliancy of the light source, but owing to their position in relation to the eye of the observer. It has been proved that a 25-watt tungsten filament lamp at five degrees from the line of vision is approximately as effective in reducing visibility as a 1000-watt lamp displaced thirty degrees at the same linear distance. (Page 948. Dr. Luckiesh—I.C.I. meetings.)

Now I do not like to prophesy at any time, nor on any subject, but I do believe that our children, or grandchildren, will look back in utter amazement at the way we now abuse our eyes as individuals and as a community. It is interesting to note, however, that all countries are not so backward or tolerant as Great Britain in the control of motor headlights.

Since July, 1923, the use of headlights, where there is a street lighting service, has been prohibited in France by the "Code de la route." There is a standard of street illumination laid down, but it is so low that, in effect, where there are street lamps at all, motorists must extinguish their headlights. There is a law against their use in New York, and offenders are liable to punishment. The same thing applies to the whole of Switzerland. Headlights are strictly forbidden in

Vienna. A gentleman from that city informed me with a great wealth of gesture that offenders are "put in ze clink."

BEAUTIFUL STREET LAMPS.

Up to now I have dealt with the strictly utilitarian side of street lighting. Lamp standards, lanterns, and fittings in all our towns and cities, with the exception of a few watering resorts, are designed with an eye to cost and efficiency only. But why should it be so? It was not always so, as we see by the many beautiful wrought-iron and bronze lamps and fittings used for oil lighting in the past. Why should not at least certain thoroughfares of our cities be made beautiful by street lighting? It is an amazing thing that we seem to lose all sense of proportion when we consider street lighting matters. For instance, we pay in Sheffield ½d. per week per head for our street lighting; surely it is worth more than that? I leave each one of you to make comparisons with your other items of expenditure, and consider if ½d. per week for the comfort and safety of a street lighting system is all you think you should spend in that direction.

In some of the streets in America an endeavour is being made really to add to the architectural beauty of those streets by beautiful street lamps and lanterns. It is true that in many cases the effect is quite nullified by the close proximity of ugly wooden poles carrying overhead electric cables, but still the idea is there. A good example is in the City of St. Louis, America, where early this year a new street lighting system was completed. An American friend of mine kindly sent me a booklet describing the installation. This is an extract from it:

> The light from these beautiful lamps makes the street like day; it is reflected from the fronts of buildings and from the street itself, making a lane of light without glare and without shadow. On the edges of the business district and into the districts where these people have their homes, the lanes of light extend. Here only one lamp surmounts each granite column, but it bathes the street with light, guiding the citizens homeward in safety and security.
>
> This is St. Louis at night—a city of white ways, a city of safety and comfort for those who travel its streets after darkness, a city of beautiful light. The story of how this city came from darkness into light is a story that will go down in the annals of municipal history—a tribute to public spirited citizens and to an energetic, unselfish administration.

In conclusion, may I quote from a paper read by Dr. Luckiesh before the International Commission on Illumination.

"In the foregoing discussion only a few main threads of the very complex subject of seeing have been followed. Certainly a science of seeing is being constructed, and many of the foundation-stones are in place. Many researches are still necessary, and a great amount of work and ingenuity will be involved in interpretations of scientific data. We need knowledge, but that knowledge is useless if left uninterpreted and unused. We need lighting specialists who see their opportunity and responsibility in a half-seeing world. A huge task is before us, but it is one in which we can be proud to do our part. What better way is there to add to the world's progress than in utilizing the possibilities of lighting and vision in contributing to the greater efficiency, safety, comfort, and happiness of mankind?"

Motor Transport.

The Case for the Small Delivery Van.—What the 12 to 15 Cwt. Type of Van Costs to Run.

[CONTRIBUTED.]

The small 12 to 15 cwt. delivery van having proved itself to be a well-designed vehicle capable of giving reliable and economical service at low cost, many gas undertakings are adopting this type of transport as tenders to the fleet of large vehicles and as general utility vans for service purposes. Sometimes a 3-ton or even larger vehicle may be used for a light load simply because there is no other transport available; and when a large vehicle is put to such uneconomical use, deliveries of some essential materials or supplies may be held up for lack of transport.

There are several chassis on the market to-day capable of carrying a load of about 15 cwt., fitted with a body suitable for the conveyance of gas supplies, and costing about £200 in a priming coat of grey, or £225 with back and sides painted and lettered as may be required. Tax and insurance for this van cost £15 and £15 2s. 6d., respectively. The specification is thoroughly up-to-date, including, as it does, a four-cylinder water-cooled engine developing 26 b.h.p., a three bearing crankshaft, forced feed lubrication, and a three lamp lighting set worked off a 6-volt dynamo and battery. The equipment includes a spare wheel with tyre, an engine-driven tyre pump, speedometer for costing purposes, and chassis lubrication by grease gun. A similar van has been in use by the General Post Office during the last two or three years—a fact which proves it a reliable and satisfactory vehicle. The question is, What does it cost to run a small delivery van of this type?

Running costs are determined largely by the annual mileage. If the distance is high, the overhead expenses are spread over a greater number of miles, thus lowering the cost per mile. If the mileage is below 5000 per annum, the overhead expenses are so high that motor transport becomes uneconomical, unless in special circumstances. In the table given in an adjoining column, the costs are given for 5000, 10,000, and 20,000 miles per annum; and as cost-per-mile figures may be misleading when not considered along with the annual mileage, the actual costs (as distinct from the cost-per-mile figures) are given in detail and in total.

Running expenses depend entirely upon mileage. Standing charges, on the other hand, are incurred irrespective of mileage. The Government duty of £15 is over ½d. per mile when the annual mileage is 5000, but can be reduced to less than a fifth of a penny when the mileage is increased to 20,000 per annum. An amount of £12 is allowed for garage. Though the fact that the fleet is increased by a small van may not actually cause an increase of expense under this head, it is regarded as essential by costing experts that the motor transport account should be debited with an amount which would have to be paid in the event of garage accommodation not being available.

The question of depreciation is a vexed one. It is, at best, merely a calculation, to be verified or otherwise in the light of experience. An allowance at the rate of 20 p.ct. per annum has been made in the cost table, thus writing off the original cost to *nil* in five years. It is probable, however, that the van would be exchanged for a new vehicle at the end of the second or third year, in which case the book value (written down at the rate of 20 p.ct. per annum) would represent approximately the allowance made by the commercial agent in part-payment for a new vehicle of similar type. During the first year, repairs should be comparatively negligible, as everything usually experienced under this heading, except decarbonizing and valve grinding, is covered by the manufacturers' guarantee. As the mileage mounts up, however, the likelihood of repair expense increases, and so the amount set aside for repairs is increased according to the mileage estimated.

Full-time driver's wages have been included, for, in making an estimate of this kind, it is best to err on the pessimistic side. It is most likely, however, that, if the mileage is only 5000 per annum—an average of 20 miles per day for five days per week—the driver would be given other duties, in which case only part wages would be debited to transport account. Gas undertakings already operating motor transport will realize that repair costs depend largely upon the type of driver employed, and this is specially the case in connection with a light van capable of high average speeds and making urgent journeys. It is often more satisfactory to choose an employee already well-tried and known to be reliable and careful, and have him trained to drive, rather than to employ an entirely new man to whom is given charge of an expensive and easily damaged part of the company's property. It is not always possible to keep an exact check upon oil levels and tyre pressures; and if a new man neglects one or the other, the result may be a bill for £20 or more—an amount which could have been saved by ordinary common sense.

This type of van may be expected to give 30 miles per gallon of petrol, 1000 miles per gallon of oil, and 15,000 miles per set of five tyres. In calculating the costs under these headings, the full retail price has been taken. Gas undertakings already operating motor transport will be able to buy in bulk, and so reduce costs in this direction; but, even so, a saving of a penny per gallon of petrol or 6d. per gallon of oil does not reduce the final cost to any great extent.

It is more likely that the average van, running either as a tender or on service and maintenance, will cover 20,000 miles, rather than less, in the course of a year, so that the total cost of operation is practically £350. Restricting the mileage to 10,000 miles annually means a saving of practically £60; the comparatively small saving being accounted for by the fact that overhead charges are the same in both instances.

There are advantages, however, which cannot be expressed in pounds, shillings, and pence, and which cannot be shown

Running Costs for 12-15 Cwt. Van.

Petrol—30 m.p.g., 1s. 7d. per gallon.
Oil—1000 m.p.g., 6s. per gallon.
Tyres—15,000 miles per set of five, £15 5s. per set.

Initial cost	£198
Painting	22
Total	£220

—	Miles per Annum. 5000. Actual Cost.	5000. Cost per Mile.	10,000. Actual Cost.	10,000. Cost per Mile.	20,000. Actual Cost.	20,000. Cost per Mile.
	£ s. d.	d.	£ s. d.	d.	£ s. d.	d.
Running expenses—						
Petrol	13 2 10	0·63	26 7 3	0·63	52 14 6	0·63
Oil	1 10 0	0·07	3 0 0	0·07	6 0 0	0·07
Tyres	5 5 0	0·25	10 10 0	0·25	21 0 0	0·25
	19 17 10	0·95	39 17 3	0·95	89 14 6	0·95
Standing charges—						
Duty	15 0 0	0·72	15 0 0	0·36	15 0 0	0·18
Insurance	15 2 6	0·72	15 2 6	0·36	15 2 6	0·18
Garage	12 0 0	0·62	12 0 0	0·31	12 0 0	0·15
Depreciation	44 0 0	2·10	44 0 0	1·05	44 0 0	0·50
Repair allowance	5 0 0	0·24	10 0 0	0·24	20 0 0	0·24
	91 2 6	4·40	96 2 6	2·32	106 2 6	1·25
Total running costs—						
Running expenses	19 17 10	0·95	39 17 3	0·95	89 14 6	0·95
Standing charges	91 2 6	4·40	96 2 6	2·32	106 2 6	1·25
Driver's wages	156 0 0	7·48	156 0 0	3·74	156 0 0	1·87
	£266 6 4	12·83d.	£291 19 9	6·01d.	£351 17 0	4·07d.

in a costing table. One of these is the practical assistance given to all departments by having a light van, costing little to run, available for long or short journeys at a moment's notice. Another advantage is that the light van costing only 4d. per mile to run can occasionally deputize for a larger vehicle costing three or four times as much per mile; and a third advantage lies in the facilities which can be given for prompt attention to emergency calls, and in rapid transport for maintenance engineers to whatever point their duty calls them.

The Factor of Depreciation.

There is no method of determining the exact amount of depreciation, year by year, on a vehicle or fleet of vehicles. It is only the scrap value at the end of a period of service, or the amount realized on selling in good running order (or, alternatively, the amount allowed for the old in part-payment for a new vehicle) which provides the cost accountant with data upon which depreciation can be accurately charged to transport account.

A vehicle may last three, four, or five years; and obviously the cost of motor transport must be known at the end of each year, if not more frequently. Consequently, it is usual practice to calculate depreciation upon some basis which will present a true and fair view of the value of the motor transport fleet as it appears in the statement of accounts, and at the same time allow the costing department to show transport charges in costing installations and maintenance contracts.

Estimating Depreciation.

Depreciation may represent as much as half the standing charges on a vehicle. Depreciation may amount to more than the running expenses (*i.e.*, petrol, oil, and tyres) of a vehicle; it may be more than the cost of repairs and renewals during the first year or two of service. These are facts which the transport manager realizes, and which indicate the large part played by depreciation in making up accurate estimates of operating motor transport. If the motor transport account is charged with too little depreciation in respect of a vehicle, there will be a large amount debited to the account at the end of the life of the vehicle—an amount which ought to have been spread over a number of years. If the transport account is charged with too high an amount for depreciation, the cost of operating the fleet is unduly inflated on paper, and motor transport appears at too high a figure in estimating for contract work. In these circumstances, it becomes highly necessary to have some reliable and just basis upon which to estimate depreciation year by year.

In accepting items to be charged to the trading account, the income-tax authorities allow a deduction of 20 p.ct. on the diminishing value of each vehicle. Assuming that the initial cost is £1000, there is written-off at the end of the first year £200, at the end of the second £160, at the end of the third £128, and so on, until after five years' service the vehicle stands in the books at a capital value of £327 13s. 7d. This is an arbitrary calculation, and makes no allowance for the amount of service given by the vehicle. If the life of the vehicle is 100,000 miles and the annual mileage is 20,000, then the value after five years' service is obviously much less than £327. If the annual mileage is 10,000, then after five years' service there has been used up half of the life of the vehicle. In view, however, of the improvements in design and construction of commercial vehicles taking place so rapidly, it is most unlikely that approximately a third of the initial cost is a true value to be shown in the books; and therefore depreciation should be more than 20 p.ct. on the diminishing value.

Gas Concerns Operating Motor Transport.

Unless circumstances are unusual, any gas concern operating motor transport and taking the income-tax method alone as a basis for depreciation is working on the very lowest margin. It is, in fact, dangerously near the limit, and may have to revalue the fleet in the near future, writing-off an amount in one year which ought to have been spread over several years, in order to arrive at accurate transport costs.

Transport contractors have several bases upon which they calculate depreciation, and all show a greater amount than that provided by the income-tax calculation. There is the method of estimating the life of a vehicle, allowing anything from 100,000 to 150,000 miles and writing-off a fifth or a fourth of the initial cost each year, depending on how much of the total life in miles has been used up. This method ensures that, on the completion of the mileage estimated to be the life, the vehicle is written-down to *nil* in the balance-sheet. In the table "Depreciation of Transport Vehicles," this method is worked

Depreciation of Transport Vehicles.

As Calculated by Income-Tax Authorities.

—	Balance-Sheet Value.	Value Written-Off.
	£ s. d.	£ s. d.
1st year	800 0 0	200 0 0
2nd ,,	640 0 0	160 0 0
3rd ,,	512 0 0	128 0 0
4th ,,	409 12 0	102 8 0
5th ,,	327 13 7	81 18 5

Basis of calculation: 20 p.ct. off diminishing value.

On Calculation of Life of Vehicle.

—	Annual Mileage, 20,000; Life, 100,000 Miles. Balance-Sheet Value.	Annual Mileage, 20,000; Life, 100,000 Miles. Amount Written-Off.	Annual Mileage, 25,000; Life, 150,000 Miles. Balance-Sheet Value.	Annual Mileage, 25,000; Life, 150,000 Miles. Amount Written-Off.
	£	£	£	£
1st year	800	200	834	166
2nd ,,	600	200	668	166
3rd ,,	400	200	502	166
4th ,,	200	200	336	166
5th ,,	..	200	170	166

Initial cost of vehicle in all cases, £1000.

out year by year for five years, showing the results with an annual mileage of 20,000 and 25,000 miles and a life of 100,000 and 150,000 miles respectively. For purposes of comparison, the income-tax method is also worked out on the same basis, except that 20 p.ct. per annum is the determining factor in fixing the amounts to be written-off. It will be seen that the vehicle with an annual mileage of 20,000 and a life of 100,000

is written-down to *nil* in five years, whereas, according to the income-tax basis, such a vehicle would be valued at £327 13s. 7d. On the other hand, a vehicle with an annual mileage of 25,000 and a life of 150,000 miles would appear in the balance-sheet at £170 (ignoring shillings and pence, for the sake of simplicity), but the income-tax authorities would still value this vehicle at £327 13s. 7d.

Having had a special body built and painted, and having put the new vehicle into commission, it has two entirely separate values. There is first of all the value to the gas concern—*i.e.*, the cost of replacing it with a vehicle of the same make, with a similar body just as suitable for gas service, and with an engine and chassis in as good a condition. Secondly, there is the amount which would be realized if the vehicle were sold in the open market. Naturally, there is a vast difference between the two. Some transport contractors have their fleet valued at the end of every year, assessing each vehicle at the value which it is to the firm as a going concern. Others, again, take into consideration the amount which similar vehicles bring in the second-hand market, and fix a value between this figure and the original cost. Having decided upon a value on one basis or the other, the amount of depreciation in any one year can be calculated from the previous annual valuation, and the transport account debited accordingly.

The income-tax method has one feature which is accepted by the cost accountant as being correct in theory—and that is the writing-off of a diminishing amount each year. From the point of view of accountancy, it is desirable that depreciation should be in proportion to the value. Obviously a vehicle depreciates more rapidly during its first year than during the fifth; and where it is necessary to have motor transport costs as near as possible to accuracy, it is preferable to work on this basis. Unless the fleet is both large in size and expensive in initial cost, however, the slight difference is hardly worth the additional labour.

All other factors which go to make up transport operating costs can be determined with accuracy, and the transport manager can control them without difficulty; but depreciation is an entirely different category, and demands the closest investigation, if it is to be calculated upon a just basis.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

Special Orders for the Hertford Gaslight Company and the East Hull Gas Company, having passed the Special Orders Committee, have been approved.

The Hertford Gas Order and the East Hull Gas Order, having been passed by the Special Orders Committee, were approved by the House. The only Gas Order now outstanding in the House of Lords is that in respect of Chorley, which is still awaiting consideration by the Special Orders Committee.

House of Commons.

Special Orders.

Special Orders made on the application of the Hertford Gaslight Company and the East Hull Gas Company have been approved.

Coal Mines Bill, Second Reading.

It was unfortunate that the position of the gas industry in relation to the Coal Mines Bill received no adequate consideration in the course of the Second Reading Debate. We understand that Mr. W. J. Womersley, Conservative M.P. for Grimsby, was fully prepared to put the case against any increase in coal prices on behalf of the gas undertakings, but, owing to the number and length of other speeches, he did not get an opportunity to do so.

Mr. GRAHAM, the President of the Board of Trade, in moving the Second Reading, frankly admitted that gas undertakings must expect to pay more for their coal. He mentioned that between 35 and 40 million tons of coal were going to public utility organizations without obtaining a remunerative or even an economic price. As regards the public utility organizations, he did not wish to say a single word in criticism of their work. The Labour Party, as much as any Party, had a regard for them as being regulated public utilities. Gas was regulated under a whole series of Acts of Parliament. These were industries which had either some form of guaranteed return or a monopolistic nature, or had the power of passing on to consumers increased charges. He had discussed this matter with members of those industries who knew how difficult the position was. They did not dispute that it was only fair that they should pay a reasonable price for their coal. He knew they had made a protest, as they were bound to do; but the fact remained that they could not go on selling coal on that basis.

Major LLEWELLIN, Conservative M.P. for Uxbridge, said the idea of the Bill was to put the extra price on the consumers, and the President of the Board of Trade had talked about the electricity industry, the gas industry, and the Railway Companies. All these three would put it back again on the private consumer, and worse still on the consumer who was a producer of goods in this country. Quite a large percentage of gas sold in this country went to industrial concerns.

Mr. J. DE ROTHSCHILD, Liberal M.P. for the Isle of Ely, quoted the statement made recently by the President of the Institution of Gas Engineers (Mr. C. S. Shapley, the General Manager of the Leeds Corporation Gas Department):

> Though there is no such thing as a protectionist association for all consumers of coal, it must be remembered that public utility undertakings can continue to get perfectly satisfactory supplies of coal from abroad, and they were in fact compelled to do so during the general stoppages of 1921 and 1926.

Col. LANE FOX, who was Minister for Mines in the late Government, said that, before the price of coal was raised to gas companies, electricity undertakings, for domestic purposes, and all that was implied in those undertakings, they must have an absolute guarantee that some rise in price was necessary, and that every possible economy had been practised beforehand.

Mr. BEN TURNER, Minister for Mines, repudiated the statement that this was a dear coal Bill. He added, however, that, as a result of competition between pits, there had been very severe undercutting of prices during the past few years, particularly for industry and public utility concerns, where prices had been unjustifiably low. There could be no justification for the sale of coal below the cost of production, but every member knew that coal had been sold to gasworks, to electric light works, to bye-product plants, and to many other concerns at a price below which it could not be produced to make a profit or to pay a decent wage.

The Marquess of HARTINGTON, Conservative M.P. for West Derbyshire, said that there were vast possibilities of increasing the use of coal in the Home Market. Electrical development was going on at a very rapid rate and—what might not be so generally known—the gas industry was expanding at an even faster rate. When either electricity or gas were first introduced in a district they might to some extent compete with the use of coal which had been previously burned in the raw state, but the development in the electricity and gas trades was ultimately reflected in the coal trade in increased tonnage. Much of the increased consumption of gas and electricity replaced not coal burnt raw, but paraffin or petroleum lamps or candles. The gas trade was in a state of great activity at the present time, and they heard of vast possibilities in low-temperature carbonization and other processes, and the expansion in the use of gas by new methods of distribution and generation, such as had been applied at Nuneaton. They were undoubtedly on the eve of great expansion in the gas industry, but all these things depended on an abundant and continuing supply of cheap coal.

Mr. BOOTHBY, Conservative Member for East Aberdeen, said that they would go to the country and explain to the farmers and the gas consumers exactly how it was that the price of gas and coal had been raised.

Mr. WINSTON CHURCHILL quoted the references to public utility undertakings which Mr. Graham had made in opening the Debate, and congratulated him on his frankness. He said that electricity, gas, railways, and other public utilities—many of them administered by local authorities—would have to pay more for their coal, and would have to recover that from their consumers. These great services had been singled out for a particular purpose. The struggling railways with their traffics falling from year to year; gas, which was so vital an aid to industry, so humble an assistant in the poorest home; electricity, on which high hopes had been founded—all these were to become the instruments of a new private tax collection for the benefit of one section of the community.

The PRIME MINISTER, in winding up the Debate, said that the price of coal had hitherto been regulated by the most extravagant internal competition. Coal in bulk and on average was sold at uneconomically low levels, which did not permit of a proper organization of the industry, the payment of decent wages to the miners, or even the making of profits.

The Second Reading of the Bill was carried by 281 votes to 273, and the Bill was referred to a Committee of the whole House.

Falk, Stadelmann & Co., Ltd.—The Veritas Incandescent Mantle Works, Wandsworth, held their Annual Christmas Party and Dance on Monday, Dec. 23. It was a very happy gathering, numbering about 450, including the Directors and Managers from the Head Office, Farringdon Road. The Chairman, Mr. Max Falk, thanked the staff for their untiring energy, loyalty, and co-operation during the past year. Music was provided by an exceptionally good orchestra, and dancing continued until the early hours of the morning.

Gas Poisoning Committee.

[Concluded from Vol. 188, p. 845.]

The sitting on Tuesday, Dec. 17, of the Committee appointed by the Government to inquire into the danger of accidents by coal gas poisoning was the final one for the taking of evidence, so far as the Committee is aware at present.

Prior to the sitting, the members of the Committee took advantage of the invitation extended to them a few days previously by Mr. Goodenough to visit the laboratories at Watson House.

The only witness on Tuesday afternoon was Mr. *Albert Stokes* (Joint Manager of the South Metropolitan Gas Company). The Company's area of supply comprises 52 square miles; the area is supplied through 1460 miles of mains, and the consumers number 420,000, of whom 319,000 are supplied through coin meters. Mr. Stokes' evidence was confined to the methods adopted to ensure that installations, pipes, and appliances for the use of gas are designed, manufactured, and fitted in such a manner as to render them safe, and so reduce the number of preventable accidents to a minimum.

He pointed out that the coin meter installations, consisting of pipes, meters, fittings, and appliances—almost exclusively supplied and installed by the Company—remained in the Company's ownership, so that the obligation was upon the Company to maintain them in a safe and efficient condition. Each consumer was visited at five-weekly intervals by a collector, who was required to report immediately any defects which might be brought to his notice. Each consumer supplied with gas through ordinary meters (of which there were 101,000) was also visited monthly by a meter reader, whose duty also included an inquiry as to whether the supply of gas was satisfactory and the appliances efficient. By these regular visits to all classes of consumers, a reasonably close touch was maintained between them and the Company.

The nature of fatal accidents which had occurred in the period from 1922 to 1928 in the area supplied by the Company was then discussed. They numbered 22, and, of these, 3 were caused by inhaling products of combustion from geysers; 14 through gas being turned on accidentally; 2 through leaky fittings; and 2 through flames on cooking stoves being extinguished by water boiling over.

With regard to geyser accidents, he said that two occurred in 1922 and one in 1923. The geyser which was the cause of one of the accidents in 1922 was also responsible for a death in precisely similar circumstances in November, 1919. Responsible officials of the Company had called upon the owner of the geyser in November, 1919, and again in October, 1921, in an endeavour to induce him either to fix a flue or do away with the geyser, but, unfortunately, without success.

It was to be regretted, he said, that there was still a small number of geysers in use without proper means of ventilation, and in respect of which the owners had declined the Company's offer to rectify.

The CHAIRMAN (Sir Evelyn Cecil) asked if there were by-laws relating to this matter.

Witness said there were not.

In regard to the fourteen accidents caused by the gas being turned on accidentally, he said that in five of these (resulting in six deaths) it would appear that the taps were defective. (He exhibited some of these taps, and said that some of the types represented were not fixed to-day.)

There were two accidents due to leaky fittings; in one case the stem of a pendant was found to be split, and in the other a cork used as a plug had been removed from the opening of a gas pipe.

Witness then discussed the means taken to eliminate unsafe appliances; and in order to show what could be done by a persistent endeavour to scrap appliances which were not safe in use, he gave the following example. In 1902 the Company had decided to record the accidents happening through the use of waterslide chandeliers, and it was found that in the three years from 1902 to 1904 there were 35 accidents, resulting in injury to 24 persons (though they were not fatal). In 1905 a definite campaign was commenced to secure, by a simple alteration, and at the Company's expense, the safety of these appliances. From 1905 to 1909 there were 44 accidents due to defective waterslide chandeliers, resulting in 36 personal injuries, one of which proved fatal. During this period 44,000 of these appliances were altered. From 1910 to 1927 an immunity from accidents from this source was experienced, some 52,000 fittings in all having been converted. In 1928 there was a fatal accident caused through a fitting which the consumer had neglected to have altered. There were still 19 in use, however, the owners of which had definitely declined to alter them, in spite of repeated overtures by the Company. Altogether 53,000 fittings had been converted, at a cost to the Company of £12,000.

The safety of the gas appliances and apparatus on the Company's area of supply was a matter of constant concern to the Directors; and any accident, of whatever nature, to a consumer was reported direct to the Board at their following weekly meeting. The circumstances received careful consideration, and effect was given to any suggestion or recommendation, general or otherwise, which might be made as a result.

To acquaint the Committee with the Company's practice in the matter of the design, construction, standardization, and testing of gas mains, services, meters, piping, fittings, and gas appliances, with the object of decreasing the risks of poisoning through escapes of gas, he presented copies of a brochure containing details of the tests and specifications adopted. These related to mains and mainlaying, for both low and high pressure systems of distribution; to service pipes (the quality of the material used in their manufacture and the mechanical tests to which they are subjected); to the internal fittings and connections from the service pipes to the consumers' appliances; to the specifications for the materials used in the construction of gas meters; and to the requirements of the Company in regard to the efficiency of cooking stoves, gas fires, hot water circulators, and geysers. (The brochure was prepared for the information of the Committee, and contained many illustrations of the apparatus used.)

In reply to questions by the Chairman, witness said there were not many outside contractors who carried out the work of carcassing houses, but a large number of gas appliances of which the Company did not approve were being supplied by shopkeepers and dealers.

The CHAIRMAN drew attention to a statement in the brochure to the effect that the use of the so-called flexible tubing was entirely discountenanced by the Company, and that solid-drawn brass tubing of 19 gauge was alone employed. He asked if the Company supplied gas irons.

Witness said that they did. Those were the only appliances for which flexible tubing was supplied.

As examples of dangerous appliances, he exhibited two small gas heaters which he had bought in South London on the previous day. These were supplied with gas through flexible tubes, and were intended for use in small rooms. They had no provision for conducting the products of combustion to the outer air, and he regarded them as unhealthy. The larger of the heaters exhibited burned 25 c.ft. of gas per hour.

Questioned by the Chairman as to how this difficulty might be overcome, he recalled the recommendations made by Mr. Butterfield in 1924—that the Board of Trade might be empowered to take necessary steps. He did not think anything had yet been done to give effect to that. The gas companies, he said, were governed by the provisions of the Gas-Works (Clauses) Act, and had no authority beyond the gas meter.

Asked if he would like this power extended, he said he thought he would. Also, he pointed out that the electrical undertakings had very much wider powers than the gas undertakings in regard to the inspection and supervision of fittings. It was provided in the Rules and Regulations of the Electricity Commissioners that the undertakers should not connect consumers' wires with the mains unless reasonably satisfied that the connection would not result in leakage. If they were reasonably satisfied that leakage existed at some part of the consumers' wires or fittings to such an extent as to be a source of danger, any officer of the undertaking so authorized could, for the purpose of discovering whether leakage existed, require by notice that the consumer should within reasonable time permit him to inspect. It also gave the undertakers power to disconnect supplies in the event of the consumers refusing permission for necessary work being done. It would be greatly to the advantage of the gas undertakings if they had more power, possibly even to the extent of disconnecting the supply if they had reasonable grounds for doing so.

The CHAIRMAN asked if he would be prepared to take responsibility for cutting-off the gas if it was dangerous.

Witness said he would, if they were given statutory authority to do so.

The CHAIRMAN asked if responsibility would also be imposed on the Company in that case for failing to detect a dangerous fitting.

Witness said he did not think so; that would be going too far.

The CHAIRMAN said that, supposing a local authority reported that a fitting was dangerous, and the Company had the power to cut off the supply of gas because of that report, the Company would be taking a responsibility.

Witness replied that they would not cut off the gas without good reason. They wanted to retain all their customers, but at present, if a fitting was reported as being dangerous, they had no means of rectifying it or compelling the user to alter it.

The CHAIRMAN asked what he would suggest as a remedy.

Witness suggested that the Institution of Gas Engineers, or the National Gas Council, or both, might draw up some general specifications and that the Board of Trade should be empowered to give gas undertakings authority to deal with dangerous fittings and appliances with a view to preventing accidents.

The CHAIRMAN: You mean that general conditions should be laid down which must be complied with when setting up this apparatus?

Witness agreed.

Questions were put by the Chairman as to the supply of water gas with coal gas. Most of the witnesses on behalf of the National Gas Council, he said, had urged the necessity of retaining the freedom given to gas undertakings as to the percentage of water gas which could be supplied in town gas. He understood, however, that the South Metropolitan Company supplied a straight coal gas without carbon monoxide.

Witness replied that they supplied a straight coal gas and did not make water gas. There was no water gas plant at their works.

Asked if the Company worked in association with the South Suburban Company or other undertakings which supplied water gas, he said that the South Suburban Company had recently come into association with the South Metropolitan Company. The former had water gas plant at their works, and that plant had not been interfered with.

The CHAIRMAN asked if the South Metropolitan Company's policy was successful from the commercial point of view.

Witness replied that the Company could, and did, meet the peak demands for gas without water gas plant; they had sufficient coal

gas retorts to provide a margin. He was not in a position to say, however, which of the two practices was the better.

Replying to questions by Prof. R. V. Wheeler (a member of the Committee) as to the inspection of fittings, he said there was no regular inspecting staff for making systematic inspections. Defects which occurred were reported to the collectors and index readers. In addition, when an index reader visited a house it was his business to ascertain from the consumer the details of appliances in use, and those appliances, whether owned by the consumers or not, were entered in the index book. Thus, the staff were able to ascertain when additional appliances had been fixed. The same practice was followed in the case of coin meter installations. The collectors were expected to have on their cards a clear statement of the appliances connected to the slot meters. There was also a system by which gas fires were inspected by a duly qualified man once in every year.

Prof. WHEELER asked whether, if the owner of a flueless geyser consented to have a flue fitted, he would have to pay for it.

Witness said that he would.

Prof. WHEELER suggested that this might be the reason why some had refused to have the alteration made.

Witness did not think so. The price charged was moderate. The attitude of those who would not have flues fitted was in most cases that they could look after themselves.

The same attitude was taken by the remaining 19 consumers who would not have their water-slide chandeliers altered. The Company had offered to bear the cost of alteration.

Replying to questions by Sir JOHN ROBERTSON with regard to the system adopted to deal with leakages, he said that, when a smell of gas was complained of, the collector who received the complaint telephoned the nearest depôt, and a man was sent at once to the consumer's premises to deal with it. As showing how infrequent such complaints were, he said that on one large estate in the Company's district, where some 8000 houses had been fitted for the supply of gas during the last five years, there had not been a single complaint of an escape.

The Company did not fix geysers unless they were able to make adequate provision for flues to carry away the products of combustion into the open air. On each flue there was a baffler which to a great extent prevented down-draughts.

Asked how long these bafflers lasted, he said that in his experience up-to-date bafflers which were well made had a long life.

This concluded the evidence, and the CHAIRMAN indicated that this would be the last meeting for the taking of evidence, unless it was decided otherwise at a later date.

Gas Acts (1920 and 1929) Orders.

SECTION 6.

Atherton Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 14·4d. per therm.

Bangor Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Corporation shall be 14·4d. per therm.

Dukinfield Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Corporation shall be 12d. per therm.

The following rates of discount shall have effect in lieu of those authorized by section 43 (Discount to large consumers) of the Dukinfield and Denton Local Boards (Gas) Act, 1877: On a quarterly consumption exceeding 250 therms and not exceeding 500 therms, 0·2d. per therm; exceeding 500 therms and not exceeding 1000 therms, 0·4d. per therm; exceeding 1000 therms and not exceeding 2000 therms, 0·6d. per therm; exceeding 2000 therms and not exceeding 4000 therms, 0·8d. per therm; exceeding 4000 therms, 1d. per therm.

The words "nine decimal six pence per therm" shall be substituted for "4s. per 1000 c.ft." in Article V. of the Order of the Local Government Board dated May 31, 1889.

Millom Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 14·4d. per therm.

New Hunstanton Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 14·4d. per therm.

Oldham Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Corporation shall be 10·8d. per therm.

Prestatyn Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 13·2d. per therm.

The Council may demand in respect of gas supplied through a prepayment meter a charge not greater than the charge made in respect of gas supplied to private consumers within the same part of their limits for the supply of gas through any other kind of meter or by any other method of supply. The maximum charge for the hire of any prepayment meter and fittings to be used therewith shall be: For a prepayment meter and fittings (including a cooking stove), 2·4d. per therm; for a prepayment meter and fittings (not including a cooking stove), 2d. per therm. The maximum charge for the hire of a prepayment meter without fittings shall be at the rate of 10 p.ct. per annum on the cost of the meter.

The Council shall be entitled, if they think fit, to require a deposit of 1s. in each quarter for a prepayment meter, provided that the amount collected from the prepayment meter during such quarter shall be applied in the first place in refunding the said deposit to the person who has paid the same, and subject thereto the deposit shall belong to the Council. Notice of the effect of this sub-section shall be printed on a card to be attached to every prepayment meter.

Ramsgate Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Corporation shall be 12d. per therm.

The words "2·4d. per therm" shall be substituted for "1s. per 1000 c.ft." in the proviso to Article I. (Extension of gas limits) of the Ramsgate Order (No. 2), 1899.

Shepshed Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 12d. per therm.

Shoeburyness Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before March 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Council shall be 13·2d. per therm.

The words "10·8d. per therm" shall be substituted for "4s. 6d. per 1000 c.ft." in Article xxviii. (Application of gas revenue) of the Shoeburyness Gas Order, 1901; and "13·2d. per therm" for "5s. 6d. per 1000 c.ft." in Article xxix. (Charges of carrying Order into execution).

Sutton-in-Ashfield Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Feb. 1 give notice of the calorific value of the gas they intend to supply.

The maximum prices of gas supplied by the Council shall be 15·6d. and 18d. per therm; and these prices respectively shall be substituted for the prices of 6s. 6d. and 7s. 6d. per 1000 c.ft. mentioned in section 12 (Price of gas) of the Sutton-in-Ashfield Gas Order, 1874.

Wallingford Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

The maximum price of gas supplied by the Corporation shall be 14·4d. per therm.

The words "7·2d. per therm" shall be substituted for "3s. per 1000 c.ft." in Article xxvii. of the Wallingford Gas Order, 1899; and "12d. per therm" for "5s. per 1000 c.ft." in Article xxix. of the Order.

SECTION 1.

Tonbridge Gas Company.

To confer additional borrowing powers.

DECLARATIONS OF CALORIFIC VALUE.

April 1, 1930.

Buxton Corporation.—480 B.Th.U.
Carnarvon Corporation.—440 B.Th.U.
Filey Urban District Council.—500 B.Th.U.
Lancaster Corporation.—475 B.Th.U.
Millom Urban District Council.—450 B.Th.U.
Tredegar Urban District Council.—450 B.Th.U.
Winsford Urban District Council.—475 B.Th.U.

Birmingham Gas Department.

Reduction in Prices of Gas.

The Birmingham Gas Committee have announced a reduction in the price of gas. The following revised scale of prices will apply to gas consumed after the December reading of the meters:

Consumption per Quarter in One Premises through Ordinary Meters.

—	Per 1000 C.Ft.	Per Therm.
	s. d.	d.
Under 25,000 c.ft.	3 1	7·79
25,000 cubic feet up to 50,000 ,,	3 0	7·58
50,000 ,, ,, 100,000 ,,	2 11	7·37
100,000 ,, ,, 500,000 ,,	2 10	7·16
500,000 ,, ,, 1,000,000 ,,	2 8	6·74
1,000,000 ,, ,, 2,000,000 ,,	2 6	6·32
2,000,000 ,, ,, 3,000,000 ,,	2 4	5·89
3,000,000 ,, ,, 4,000,000 ,,	2 3	5·68
4,000,000 ,, ,, 5,000,000 ,,	2 2	5·47
5,000,000 ,, ,, 6,000,000 ,,	2 1	5·26
6,000,000 ,, ,, 7,000,000 ,,	2 0	5·05
In excess of 7,000,000 c.ft.	1 11	4·84

The above prices are subject to 5 p.ct. discount for prompt payment.

In the above-mentioned scale the existing method whereby a consumer is charged the maximum quantity at the higher rate before receiving any reduction in price has been abandoned. In future, the total consumption will be charged at the rate in the scale applicable to the quantity consumed, and there will be no differentiation between manufacturing and lighting supplies.

Gas Supplied through Prepayment Meters.

—	Under Ten Years.			Over Ten Years.		
	Per 1000 C.Ft.	Per Therm.	Per Penny. C.Ft.	Per 1000 C.Ft.	Per Therm.	Per Penny. C.Ft.
	s. d.	d.		s. d.	d.	
Meter only	3 1	7·79	27·03	3 1	7·79	27·03
Meter and fittings	3 4·66	8·56	24·59	3 1	7·79	27·03
Meter and cooker	3 5·56	8·75	24·06	3 4·66	8·56	24·59
Meter, cooker, and fittings	3 7·46	9·15	23·01	3 4·66	8·56	24·59

The above-mentioned prices relating to automatic meters are for consumptions up to 25,000 c.ft. per quarter; the same reductions in price for quantity consumed will be given as in the case of the ordinary consumer.

New Gas Kitchen and Service Room at Yeadon.

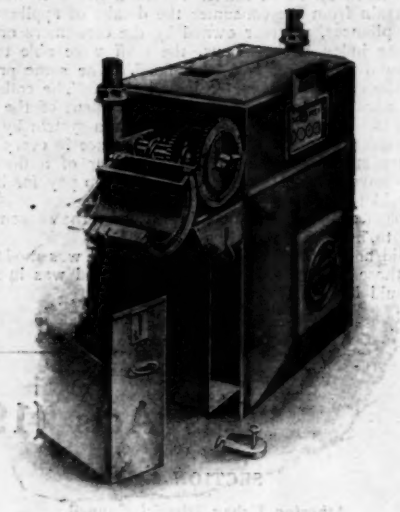
On Dec. 19, the Yeadon and Guiseley Gas Company gave a dinner to the Yeadon Urban District Council, to inaugurate a new gas kitchen and service room at the Town Hall, Yeadon. In addition to the members and officials of the Yeadon Council, the guests were composed of the members and officials of the Councils for the neighbouring townships within the Company's area of supply. The President of the Institution of Gas Engineers, Mr. C. S. Shapley, and the Secretary, Mr. J. R. Willis Alexander, and also Mr. E. H. Hudson, Chairman of the Yorkshire Commercial Section, were present.

The equipment of the kitchen, which is as follows, was supplied by Messrs. Wilsons & Mathiesons, Ltd.: One double cooking range, a single cooking oven, a 6-ft. "Efficiency" hotplate, a "Premier" low-pressure steamer, a hot closet and carving table with sunk copper tinned dishes, covers, overhead gear, &c. (all these appliances in mottled grey porcelain enamel), and a Jackson self-feeding boiler, nickel plated.

Watkin Heating Company has been registered with a nominal capital of £6000 to carry on the business of heating, gas, electrical, and general engineers. Directors: W. and F. E. Watkin, 60, Westborough Road, Westcliff-on-Sea.

Gas Cookery Exhibition at Hebden Bridge.—Hebden Bridge and Mytholmroyd Gas Board has recently conducted a successful gas cookery exhibition, at the Co-operative Hall. Various well-known manufacturers of domestic gas appliances exhibited, and Miss Tuxford gave demonstrations in cooking and baking. There were 42 entrants for the public cake and baking competition, of which Miss Tuxford was the judge. At the closing of the event last week, Mr. T. H. Nield, the Gas Manager, and his staff, were publicly complimented on the efficient manner in which the Exhibition had been organized and prepared.

Christmas Display at Neath.—The Neath Corporation Gas Department Showroom in New Street, Neath, had a special Christmas show of cookers, gasfittings, and small labour-saving devices which made attractive Christmas presents. The showroom was excellently lighted, and softly coloured hanging bowls were displayed to the best advantage. The shop was a centre of attraction, and added considerably to the seasonable appearance of the street. Since the premises have been open, a closer connection has been established between the Department and their consumers. The showroom is central, and occupies a commanding position. Thanks to the enterprise of the Manager, Mr. W. Clark Jackson, and his staff, the Department had a good share of Christmas shoppers.



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WITH

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EVERY PART INTERCHANGEABLE

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OF THE SLOT METER

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(BRANCH OF METERS LIMITED)

MILES PLATTING, MANCHESTER

RADFORD ROAD, NOTTINGHAM

45-47, Westminster Bridge Road, LONDON, S.E.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 24.	Rise or Fall on Week.	Transactions Lowest and Highest during the year 1929.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 15	5	5	Aldershot 5 p.c. max. C.	70—75	..	70½—77
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	71—74	..	71—76
1,551,868	,,	Sept. 26	7⅛	7⅛	Alliance & Dublin Ord.	93—96	−2	94—102
374,000	,,	July 11	4	4	Do. 4 p.c. Deb.	62—65	..	66—67½
522,655	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112—115	..	112½—117
300,000	1	Oct. 24	1/4⅛	1/4⅛	Bombay, Ltd.	16/- - 18/-	..	16/- - 22/-
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	12⅞—13½	..	12⅞—13½
500,050	10	,,	7	7	Do. B 7 p.c.	12⅛—12⅞	..	12⅛—13⅛
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10⅛—11	..	10⅞ 11⅛
50,000	Stk.	Dec. 19	3	3	Do. 3 p.c. Deb.	53—56*	−1	54—56½
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	71—74*	−1	73—77
357,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	113—117
371,880	,,	,,	6⅞	6⅞	Do. 5 p.c. Con.	100—103	..	100½—104
1,287,500	,,	July 25	5	5	Bristol 5 p.c. max.	87—89a	..	..g
855,000	,,	Sept. 12	7½	7	British Ord.	114—117	..	113—120½
100,000	,,	Dec. 19	7	7	Do. 7 p.c. Pref.	109—114*	−3	113—118
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—71*	−2½	71—76
450,000	,,	,,	5	5	Do. 5 p c. Red. Deb.	92—95*	−2	94⅞—96½
100,000	10	Dec. 5	8	6	Cape Town, Ltd	8½—9½*	..	8½—10 1/16
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	6½—7½
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb.	69—74*	−2	72½—76½
626,860	,,	July 25	6	6	Cardiff Con. Ord.	98—101	..	98½—100
237,860	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	100—103
157,150	,,	Aug. 15	6½	5	Chester 5 p.c. Ord.	87—92b	..	87—91½b
98,936	1	Oct. 10	†2/-	†2/-	Colombo, Ltd. Ord.	34/—36/-	..	37/—38/-
24.495	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	19/—21/-	..	23/-
375,402	1	Oct. 10	1/9⅛	1/9⅛	Colonial Gas Assn. Ld. Ord.	23/6—25/6	..	23/6—26/6
187,848	1	,,	1/7⅛	1/7⅛	Do. 8 p.c. Pref.	20/—22/-	..	21/6—22 3
2,073,280	Stk.	July 25	7	5	Commercial Ord.	90—95	..	90—102
475,000	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	54—57*	−1	55—60½
787,560	,,	Aug. 15	7	7	Croydon sliding scale.	104—107	−1	103—114
403,100	,,	,,	5	5	Do. max. div.	80—85	..	78—87
542,270	,,	Aug. 29	10	7	Derby Con.	118—121e	..	..g
55,000	,,	Dec. 19	4	4	Do. Deb.	67—70e*	−1	..g
209,000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	73—75	..	Nil
1,002,180	10	Sept. 12	†7	†4	European, Ltd.	12½—14½	..	9⅞—25
18,708,480	Stk.	July 25	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	17/9—18/3f	..	17/6—20/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60—62	..	60½—66½
4,157.020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	73—76	..	70—81
5,602,620	,,	Dec. 19	3	3	Do. 3 p.c. Con. Deb.	56—58*	−1	55—62
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100*	−½	97—102
82,500	,,	Aug. 29	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	..	97½—101½
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	77—82	..	76½—85
70 000	10	Oct. 10	†10	†10	Hongkong & China, Ltd.	13½—14½	..	13½—14⅝
213,200	Stk.	Aug. 29	6	6½	Hornsey Con. 3½ p.c.	84—87	..	85½—90
1,976,000	,,	Nov. 21	20	10	Imperial Continental Cap.	330—350	−5	195—495
223,130	,,	Aug. 15	3½	3½	Do. 3½ p.c. Red. Deb.	71—76	..	70—75
235,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord.	115—118	..	120—122
2,145,907	,,	Aug. 15	6⅝	6	Liverpool 5 p.c. Ord.	91—92b	..	90½—96⅜b
600.000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	100½—102½b	..	101—103½b
165,736	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap.	122—127	..	123—129
63,480	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	52—55*	−1	53—55
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean	5½—6*	..	5½—6⅛
392,000	—	Oct. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	92—95	..	92½—101¾
541,920	Stk.	Nov. 21	†9	†6	Montevideo, Ltd.	103—106	..	96½—108
2,061,315	,,	July 25	5⅝	5	Newcastle & Gateshead Con.	16/3—16/9df	+/-/4½	
682.856	,,	,,	4	4	Do. 4 p.c. Pref.	71¾—72½d	..	..g
691,705	,,	Dec. 19	3½	3½	Do. 3½ p.c. Deb.	65½—66¼d*	−1¼	..g
131,780	,,	Aug. 29	7/1/0	7½	North Middlesex 6 p.c. Con.	112—117	..	..g
396,160	,,	Aug. 15	5	5	Northampton 5 p.c. max.	76—79	..	105—114
300.000	,,	Nov. 21	7	9	Oriental, Ltd.	108—113	..	Nil
205,162	,,	June 27	8	8	Plym'th & Stonehouse 5 p.c.	110 · 113	..	111½—120
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4 p.c. Std	113—118	..	111—113
241,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	..	110—117⅞
2.334,464	1	June 27	—	†5	Primitiva Ord.	26/—29/-	−2/-	80—84
244,500	100	Dec. 2	4	4	Do. 4 p.c. Red. Deb.	91—94*	..	26/14—39/9
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82	..	92½—95½
4 6.345	,,	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	77—80*	−2	79½—82
150,000	10	Sept. 26	6	6	San Paulo 6 p.c. Pref.	8½—9	..	79—82
1.736 968	Stk.	Aug. 29	6¾	6½	Sheffield Cons.	104—106e	..	8¼—9
95,000	,,	July 11	4	4	Do. 4 p.c. Deb.	75—77e	..	..g
90 000	10	June 13	†4	†4	South African	4—6	..	..g
6,609 895	Stk.	July 26	7½	5	South Met. Ord.	99—101	..	4½—5½
500,000	,,	,,	6	6	Do. 6 p.c Irred. Pf.	106—109	..	99—110
1,895 445	,,	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	106½—112
734.000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	98—100	..	54—61½
91,500	,,	Aug. 15	8½	8½	South Shields Con.	109—111d	..	98½—102½
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 5 p c.	104—104	..	..g
468,837	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	92—95*	−2	100½—111
647,740	,,	Aug. 15	5	5	Southampton Ord. 5 p c.max.	77—80	..	94—100
121.275	,,	Dec. 19	4	4	Do. 4 p.c. Deb.	68—71*	−2	76½—80
179,014	,,	July 25	8	8	Sutton Ord.	116—119	..	73—74½
67,828	,,	June 27	5	5	Do. 5 p.c. Deb.	90—93	..	116—118½
250,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red Pref.	100—102	..	92—93
200.000	,,	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	97—99*	−3	100—102
1,002,275	,,	Aug. 15	6⅝	6⅝	Tottenham District Ord.	101—106	..	100—102
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	102½—108
181,255	,,	Dec. 5	4	4	Do. 4 p.c. Deb.	72—75*	..	93
289,094	,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	97—102	..	72½—79
88,390	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	94—98
30,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Elsom— Wandsworth A 5 p.c.	135—140	..	90—92
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200,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—92	..	128—134
88.416	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	53—56*	−1	91—94
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	72—75*	−2	56—57½
207,500	,,	,,	5	5	Do. 5 p.c. Deb.	91—95*	−2	74 79
								105—120

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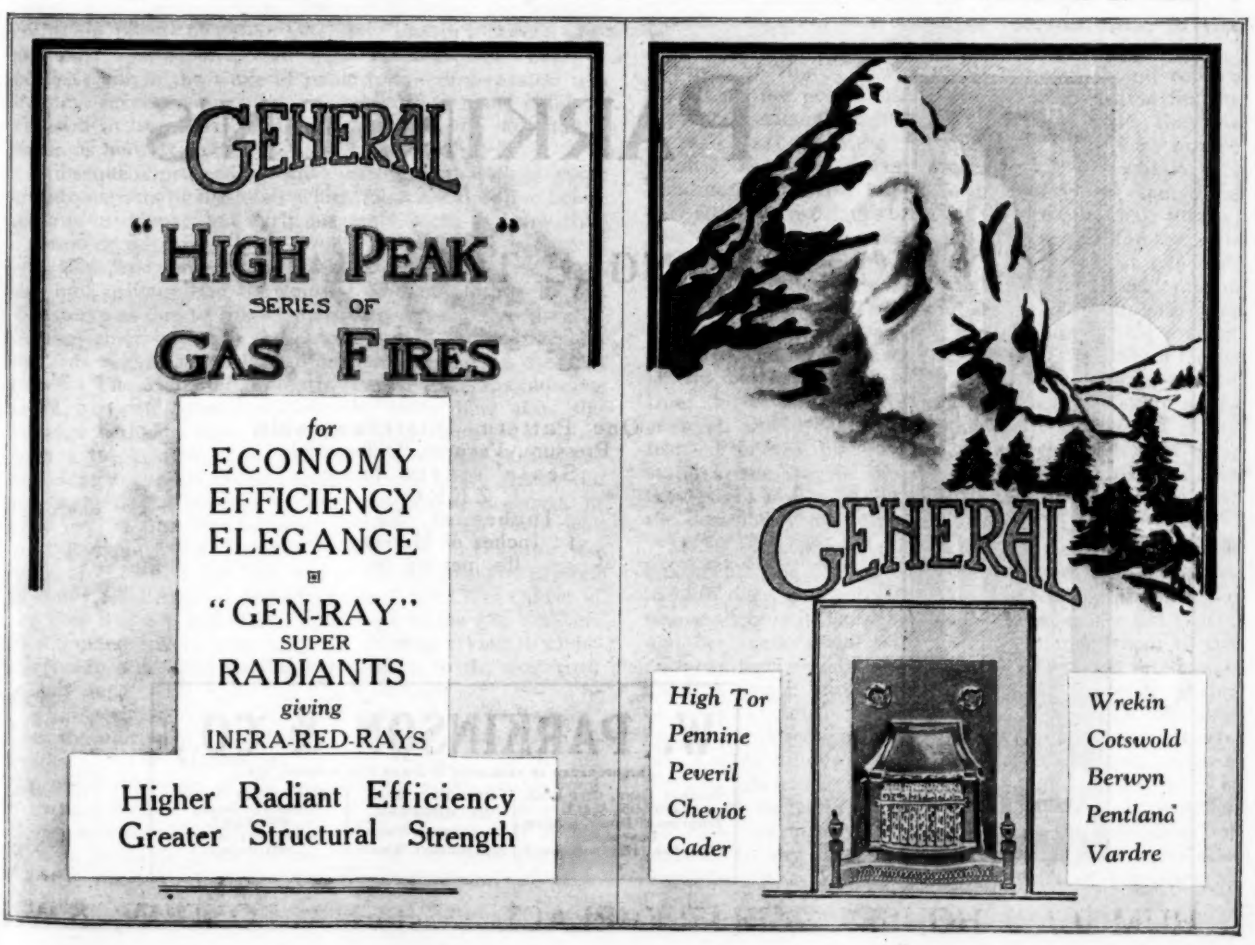

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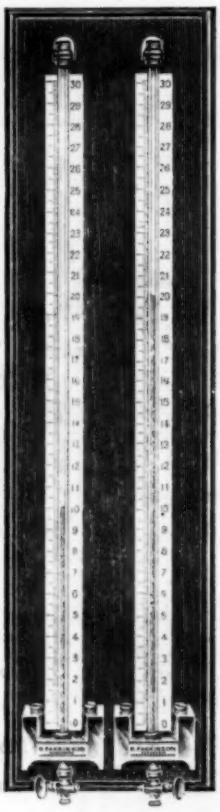

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